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Original Articles

Osteoid Osteoma: Etiology and Pathogenesis
Report of Twelve New Cases

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IT IS the purpose of this paper to describe briefly the clinical, roentgenologic and pathologic features of 12 new cases of osteoid osteoma. On the basis of this study and a review of the literature there will be discussed some of the controversial phases of this condition, namely its etiology and its pathogenesis.

In 1935 Jaffe called attention to an osseous lesion previously described by some authors and classified by them as a disease of inflammatory origin. Jaffe described the condition in detail; he noted that it appeared to follow a distinctive clinical, roentgenological and morphologic pattern. It was his considered opinion that this was not an inflammatory lesion but a slow-growing benign osteogenic tumor. Predicating his suggestion upon this new concept of the pathogenesis of the condition as well as upon its morphologic configuration, he proposed the name "osteoid osteoma."

Soon after Jaffe's original report of 5 cases, it was shown that the condition was unique but not rare. Six additional cases came to his attention in 1936, and numerous reports of individual cases and small groups of cases were published by different authors. In 1946 Sobel was able to collect 106 cases from the literature. Approximately 150 cases have been reported to date, and by and large the concept of tumor has been accepted. A small minority of authors, however, still relegate this condition (and in our opinion with reason) to the category of inflammatory disease. This will be discussed in greater detail later in this paper. Although the etiologic factors may as yet be conjectural, there appears to be no doubt that this disorder represents a distinct pathologic and clinical entity.

From the Department of Laboratories of the Jewish Hospital of Brooklyn.

CLINICAL FEATURES

Osteoid osteoma is an oval or round sharply circumscribed lesion of the bones measuring from a few millimeters up to 2 cm. in diameter; it usually measures about 1 cm. Almost invariably it is a single, isolated lesion; only 2 instances of dual lesions in one bone have been reported (Lapidus; Salem and Sherman). Histologically it consists of a substratum of vascular osteogenic connective tissue in which are seen variable quantities of calci-

fied and uncalcified osteoid tissue, trabeculae of newly formed atypical bone, and numerous giant cells. It may be found in the spongiosa of a bone or in the cortex. In the latter area it may occupy the midcortex or its subperiosteal or endosteal surface. At times it abuts on the joint cartilage, and occasionally it erodes through it. Surrounding the osteoid nidus there is usually a considerable area of perifocal sclerosis, extending for variable distances beyond the lesion.

Osteoid osteoma has been reported as occurring in the bones of every part of the appendicular and axial skeleton except the ribs. It is probably only a matter of time before it will be observed in that area also. Willis, in his discussion of solitary osteomas of the skeleton, described a characteristic lesion in the temporal bone of the skull. He believed it to be a hamartoma. Benjamins also reported it as occurring in the nasal sinuses. Generally speaking, it has a special predilection for the bones of the legs. In more than half of the cases reported in the literature the lesion was located in the tibia or the femur; less frequently it was seen in the upper limbs. In the present series of cases the lesions were distributed as follows: tibia, 6; femur, 1; humerus, 2; spine, 2, and os calcis, 1.

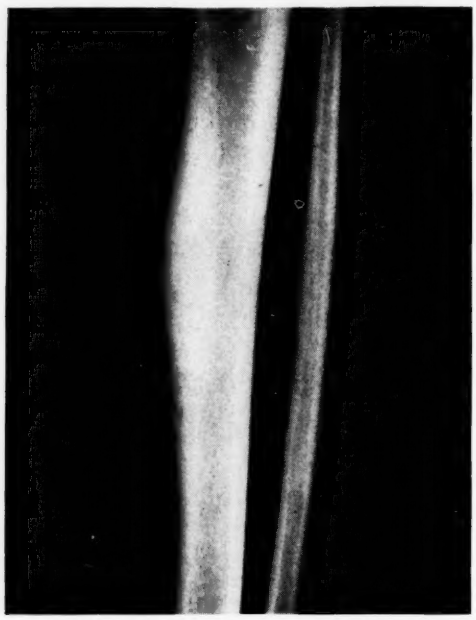

Fig. 1 (Case 1).—Roentgenogram showing an oval area of radiolucency occupying the cortex of the tibia, surrounded by sclerotic bone of increased density. The affected bone is thickened in this area as a consequence of periosteal new bone deposition.

This condition is predominantly a disease of adolescents and young adults between the ages of 10 and 25 years. Only occasionally is it encountered in persons beyond the third decade of life. The youngest patient whose case was reported in the literature was 14 months of age, the oldest 55 years. The average age in our own cases was 19.5 years; the oldest patient was 33 and the youngest 10. Generally speaking, the lesion predominates in the male in the approximate proportion of 2 to 1. In our series of cases there were 10 male and 2 female patients.

The chief complaint was invariably that of pain in the affected area. This varied greatly in both nature and intensity. It was described by different patients as sharp, dull, aching, boring, lancinating, burning, twitching, throbbing, drawing and digging. It was mild and intermittent at first; then it increased in persistence and severity. In some instances it was distinctly more severe at night and in damp weather. In most cases aspirin relieved the pain. Only 1 patient, in a case reported by Sobel, made no mention of spontaneous pain. In this instance attention was called to the condition by the appearance of torticollis and cervical discomfort on motion of the head. In 2 of our cases there was no history of spontaneous pain; in 1 (Case 5) the presenting complaint was that of a lump in the left leg. In another (Case 11) stiffness of the back and a change in gait preceded the onset of discomfort in the region of the lower dorsal and upper lumbar portions of the spine.

The most constant signs associated with osteoid osteoma were local swelling and tenderness. Frequently these were the only clinical symptoms. Swelling was especially evident when the muscles covering the affected bone were not too thick. When the lower limb was involved, limping was common. If the lesion occurred in or near a joint, one or more of the following signs were noted: swelling, stiffness, weakness, muscle spasm or atrophy, contracture deformities and limitation of motion. Local heat, red-

Fig. 2 (Case 1).—Photomicrograph (low magnification) showing a section through the entire lesion represented by the radiolucent area in the cortex of the tibia. Note the serration of the bone trabeculae which border the nidus and the osteoclasts in Howship's lacunae.

ness and hyperesthesia were uncommon. In 1 case there was bowing of the leg due to a lesion in the tibia (Ponsetti and Barta).

The duration of complaints at the time of admission to the hospital varied from a few months to some years. The average was six to twenty-four months. One of Jaffe's patients had symptoms for more than five years. Of the 24 patients in the cases described by Brown and Ghormley 11 had symptoms less than one year, and 8 noted symptoms from one to six years in duration. The remainder reported symptoms up to thirty-five years in duration. However, not all of the cases cited by Brown and Ghormley could be accepted as bona fide instances of osteoid osteoma, since morphologic evidence was lacking. In the present series of cases the average duration of symptoms was sixteen months; the shortest, two weeks and the longest, four years.

A history of trauma was elicited in 30 to 40 per cent of the reported cases. It was not regarded by most authors as either an eitologic or a precipitating factor; it was considered coincidental. Trauma antedated the onset of symptoms by weeks, months or years.

The most valuable diagnostic aid in the recognition of osteoid osteoma was roentgenographic study of the affected bone. Characteristically the nidus appeared as a small oval or round sharply circumscribed, radiolucent or, less frequently, radiopaque area. At times the nidus itself was enveloped by a thin radiolucent circle. This was in turn surrounded by an opaque zone of denser bone, which represented the sclerotic reaction of the bone adjacent to

the lesion. The dense perinidal reaction was narrow or wide; when the nidus was located in the cortex the perifocal sclerosis extended several inches above and below the osteoma.

Roentgen study was not always conclusive. In most of the reported cases the first impression of the roentgenologist was that of chronic inflammatory disease, usually the sclerosing nonsuppurative osteomyelitis of Garré or intracortical bone abscess (Brodie). Occasionally the diagnosis was made of syphilitic osteitis or periostitis; more rarely, of sclerosing osteogenic sarcoma and Ewing's endothelial myeloma. In the present series of 12 cases, 4 of the lesions were considered by the roentgenologist to be suggestive of bone infection, 2 were said to be either bone infection or osteoid osteoma, 4 were called osteoid osteoma, 1 was considered "negative," and 1 was interpreted as Ewing's tumor or osteomyelitis.

The reason for this diagnostic difficulty is at least in part due to the variable morphologic nature of the lesion in its various phases of development. The present concept (Jaffe) is that in its initial stage osteoid osteoma appears as a radiopaque shadow, while in its fullest maturity it is radiolucent. In its incipiency, therefore, if the perifocal density about the lesion is only slight it stands out as a distinct opacity. If, however, the adjacent hyperostosis increases and acquires the same density as the nidus, differentiation of the two is not possible; the affected area then appears roentgenologically only as a diffuse opaque area. Obviously, the lesion must evolve further to be identifiable. It then stands out as a characteristic radiolucent shadow in a sclerotic field. Even at this stage the nidus may be obscured by the adjacent hyperostotic bone. This is true especially when the lesion is in the cortex. In such instances only a blurred radiopaque shadow was seen on the roentgen film in many of the reported cases. This was corrected in most cases when increased kilovoltage was used in conjunction with Coning down on the field. Overexposure of the film in different planes in most cases caused the porotic nidus to stand out in contrast to the surrounding bone. In certain localities, such as the vertebrae and in the articular areas of the long bones, roentgenographic demonstration of the lesion was particularly difficult.

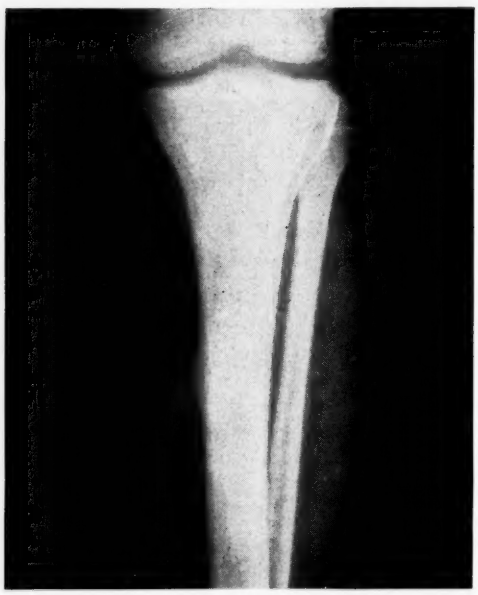

Fig. 3 (Case 2).—Roentgenogram showing an oval area of rarefaction on the surface of the cortex of the tibia, enveloped by a newly deposited layer of periosteal bone.

The cases of osteoid osteoma presented in this paper do not differ essentially in their clinical and roentgenographic manifestations from those previously described in the literature. In some of them, however, there were histomorphologic alterations not previously demonstrated. These are of fundamental importance in consideration of the nature of the lesion. The cases will be presented briefly, with stress on only such factors as are pertinent to the subsequent discussion of the etiologic and pathogenetic nature of this condition.

REPORT OF CASES

CASE 1.—S. A., a 13-year-old boy, was admitted to the Jewish Hospital complaining of pain in the right leg of two weeks' duration. It was severe and boring, coming on only at night. There was no history of trauma or infection.

Physical examination gave entirely negative results except for a small, tender elevation at the midshaft of the right tibia. The blood count showed 20,950 white blood cells per cubic millimeter of blood, of which 95 per cent were polymorphonuclear leukocytes and 5 per cent were lymphocytes.

On roentgen examination of the right leg there

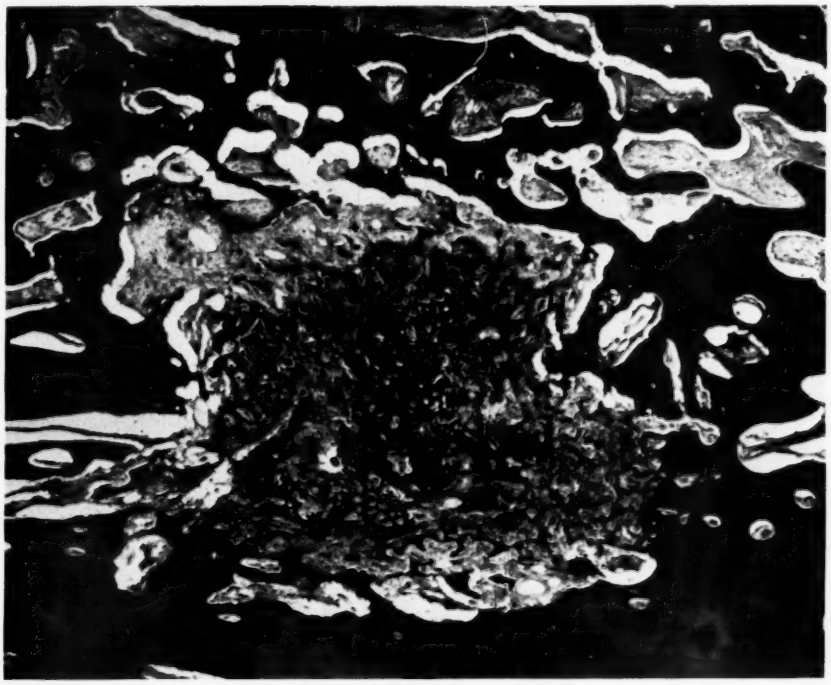

Fig. 4 (Case 2).—Photomicrograph (low magnification) showing a cross section of the entire nidus sandwiched between the cortical lamellar bone and the outer periosteal new bone.

was a localized area of periostitis and radiopacity on the anterolateral aspect of the midportion of the right tibia (Fig. 1). In the center of the densified bone was an area of rarefaction. The roentgenologist reported this as "not uncommonly found in low grade localized bone infection with secondary osteitis."

At operation, with the patient under general anesthesia, a segment of bone was removed which corresponded to the radiopaque area aforementioned; it measured 7.5 × 1.5 × .5 cm.

Recovery was complete.

Microscopic study of the excised segment of cortex showed it to consist of two dense layers of bone, which merged almost imperceptibly. The superficial or subperiosteal layer consisted of a hyperostotic zone of intercommunicating trabeculae of reticular bone. These osteophytic trabeculae were largely arranged in parallel fashion, perdendicular to the surface of the bone. In the medullary spaces there was delicate, vascular fibrous connective tissue marrow. The deeper layer of bone was composed of compact cortical lamellar bone and dense trabecular areas containing vascular connective tissue marrow. This was apparently the original cortex.

A small, round, sharply demarcated area was seen in the deeper cortical bone (Fig. 2). This was made up of a substratum of oval, fusiform, stellate and pyramidal cells that varied in size and shape and appeared to be connected by fibrillar processes. The nuclei were round or oval. Many large and small irregularly shaped multinucleated giant cells were noted. In the interstices of this mesenchyma there was pink acidophilic substance, which appeared to enclose the osteoblastogenic cells. Some amorphous calcium was seen in the masses of osteoid tissue. The surfaces of the trabeculae of cortical lamellar bone bordering this nidus were serrated, and numerous osteoclasts were seen in Howship's lacunae. Other surfaces of the trabeculae were lined with osteoblastic seams. These morphologic changes appeared to suggest that a process of lacunar resorption was widening the oval osteoid area, with a peripheral osteoblastic compensatory reactive process tending to limit its spread.

Case 2.—M. S., a 33-year-old man, was admitted to the Jewish Hospital complaining of dull local-

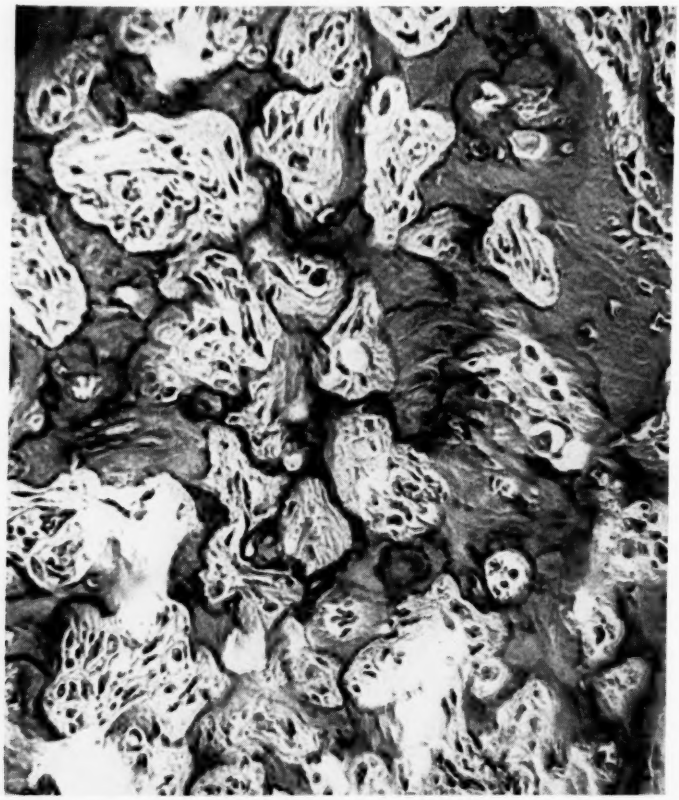

Fig. 5 (Case 2).—Photomicrograph (high magnification) showing osteoblastogenic matrix, occasional giant cells and interconnecting calcifying osteoid trabeculae.

ized pain in the upper third of the medial aspect of the left tibia, of one year's duration. This had become gradually worse and more frequent. About five months before admission a small swelling was noted in the affected area. There was no history of trauma or infection.

On examination the patient showed no positive general abnormalities. Locally a tender mass 4 cm. long was palpated on the upper third of the tibia. The blood count revealed 12,200 white blood cells per cubic millimeter of blood, with 77 per cent polymorphonuclear leukocytes.

Roentgenographic examination of the mesial aspect of the upper part of the tibia showed an area of productive periostitis with an oval area of rarefaction in to the cortex, which was considered by the roentgenologist to be suggestive of superficial infection (Fig. 3).

At operation, with the patient under general anesthesia, the entire block of affected tissue was removed. Bone graft chips were put into the resultant cavity, and the wound was closed. A plaster of paris cast was then applied. Recovery was complete.

Microscopic examination of the bone showed it to consist of a wide area of dense bone, in the center of which there was an irregular, oval, sharply circumscribed and relatively porotic area (Fig. 4). On closer inspection the latter was seen to be sandwiched between the surface of the true cortex and the adjacent reactive layer of hyperostotic osteophytic bone. This was verified by the presence of interrupted external circumferential lamellae and cement lines at the base of the lesion. The dense superficial layer of periosteal new bone consisted of large interconnecting trabeculae of quiescent, primitive bone trabeculae with medullary spaces containing connective tissue marrow. Traversing this layer were large blood vessels running

from the periosteum to the original cortex. The latter layer consisted of compact cortical lamellar bone. Near the oval lesion the cortex showed concentric and eccentric bone resorption. The spaces thus produced contained delicate connective tissue and osteoblasts. The surface of the bone adjacent to the nidus was serrated and covered in places with seams of osteoblasts. Bordering the osteoma there appeared to be direct continuity in places between the lamellar cortical bone and the calcified osteoid and reticular bone trabeculae within the oval area.

The circumscribed lesion (Fig. 5) was similar to that described in Case 1. It consisted of an osteoblastogenic matrix and giant cells in which there was osteoid tissue in various stages of calcification as well as early ossification. On the periphery of the oval area there were seen, lying free in the matrix, some partially resolved lamellar trabeculae, apparently inclusions from the adjacent cortex. A small area of periosteum was seen in which the blood vessels were numerous, large and thick walled. Occasional foci of round cell infiltration with a scattering of plasma cells and histiocytes were noted in the periosteum adjacent to the bone (Fig. 6).

CASE 3.—B. S., a 26-year-old man, was admitted to the Jewish Hospital with the complaint of pain in the upper outer aspect of the left leg, of three years' duration. Four years before admission the patient was treated for cellulitis in the same area. This cleared up completely after two weeks of treatment. During the following year the patient was hospitalized for a furuncular infection of the nose. It was at this time that pains were noted in the outer aspect of the left leg in its upper third. Roentgen examination at that time gave negative results. The next year the pains were more severe and were described as "digging." Roentgen study again gave negative results. The pain persisted, and at the time of the present admission it was extremely severe.

General physical examination revealed no abnormality. Locally there was only a circumscribed area of tenderness about 2 inches (5 cm.) below the knee. The white cell count per cubic millimeter

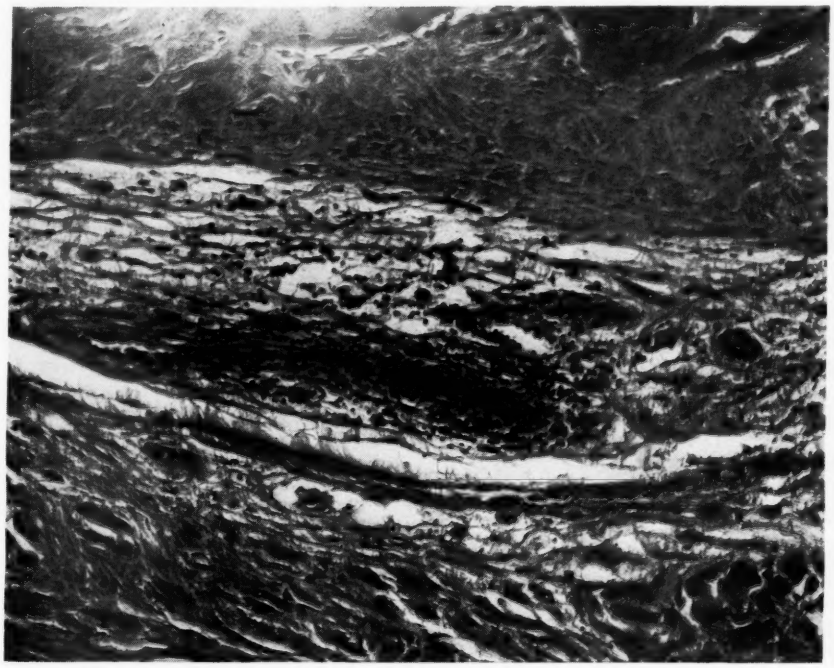

Fig. 6 (Case 2).—Photomicrograph (medium magnification) showing periosteum of the tibia adjacent to the nidus in which there may be seen round cell infiltration, some plasma cells and histiocytes and thick-walled blood vessels.

Fig. 7 (Case 3).—Roentgenogram showing an oval radiolucent shadow about 2 cm. in diameter in the upper third of the tibia surrounded by an irregular relatively radio-opaque zone.

of blood was 8,850; the differential count showed 85 per cent polymorphonuclear leukocytes and 15 per cent lymphocytes. Roentgen study showed a diffuse irregular radiopaque area on the lateral aspect of the tibia below the tuberosity. In it an oval radiolucent shadow measuring about 2 cm. was noted. The impression was that of chronic osteomyelitis or osteoid osteoma (Fig. 7).

At operation a large section of bone was removed by motor saw and osteotome. Recovery was uneventful, and the symptoms completely vanished.

Microscopic study of the removed bone showed it to consist of a layer of densely trabeculated lamellar bone which appeared to be the original cortex and a wider layer of dense lamellar osteophytic bone on its outer surface. The medullary spaces contained edematous connective tissue marrow. Between these two bone layers there was a circumscribed oval area 2 cm. in diameter and composed of a substratum of osteoblastogenic misenchyme with numerous osteoclasts and osteoid tissue (Fig. 8). In the center of the oval area there was a solid mass of osteoid tissue which on the periphery took trabecular form. Encircling this was a narrow ring of densely calcified osteoid tissue. On the outer surface there was a wide zone of interconnecting trabeculae composed of calcified osteoid and primitive bone. In some areas there appeared to be continuity between the nidal tissue and the adjacent lamellar bone trabeculae. The mesenchymal substratum of the osteoma merged with a layer of loose connective tissue which separated the osteoid from the surrounding cortical bone. In this connective tissue many small vascular elements and wide veins were seen. In places there was a predominance of delicate reticular connective tissue in which there was seen an interstitial infiltration of round cells and histiocytes; this was suggestive of granulation tissue (Fig. 9).

Case 4.—N. P., a 10-year-old girl, was admitted to the Jewish Hospital complaining of severe pain on the medial aspect of the right tibia, of ten months' duration. The pain was intermittent, recurring at intervals of several weeks and being particularly severe at night. The child was inclined to sit apart rather than run and play. About four months before admission a small mass was first noted in the region described as painful. There was no history of trauma.

General physical examination gave negative results. On the medial aspect of the right tibia, about 3 cm. below the tibial tubercle, there was a swelling measuring 4.5 cm. in length. This was not movable, but it was tender. The blood count and urine examinations revealed no abnormality. The sedimentation rate was 50 mm/hr. Roentgen examination of the affected area showed a densely sclerotic process involving the upper third of the tibia from a point just below the epiphysial line to a point slightly beneath the midportion of the tibia. The cortex was thickened, and a slight elevation of the periosteum could be demonstrated in the posterior aspect of the bone. A small radiolucent area was seen in the anterolateral aspect of the thickened focus (Fig. 10). The roentgenologist diagnosed it as chronic inflammatory disease. He could not, however, rule out osteoid osteoma.

At operation the periosteum was thickened; it was easily elevated from the bone. A sclerotic section of bone measuring 5×2 cm. was removed. In the medullary cavity there was seen an oval area about 2 cm. in length which was pink, granular and suggestive of a nidus; this was removed. The postoperative course was uneventful, and the patient remained free from symptoms.

Microscopic study of the removed sclerotic section of bone showed it to consist of dense lamellar compacta. A section of the nidus removed from the medullary cavity revealed hyperostotic lamellar spongiosa and edematous connective tissue marrow. Within the spongy bone there was a circumscribed mass of partially calcified osteoid tissue lying in a well-defined matrix of embryonal osteo-

Fig. 8 (Case 3).—Photomicrograph (low magnification) showing oval nidus surrounded by hyperostotic, sclerotic bone.

genic connective tissue. Numerous osteoclasts were noted (Fig. 11).

The attached periosteum consisted of dense fibroelastic connective tissue and contained many blood vessels. Numerous foci of perivascular round cell and plasma cell infiltration were seen; in these foci there were also scattered polymorphonuclear leukocytes and some endothelial cells (Fig. 12).

CASE 5.—G. R., a 23-year-old man, was admitted to the Jewish Hospital complaining of a "lump" on the left leg of twenty-two months' duration. He had tripped and struck his leg against a hand truck one month before he noted the onset of the lump. The mass gradually increased in size, but it occasioned no symptoms.

Physical examination gave negative results ex-

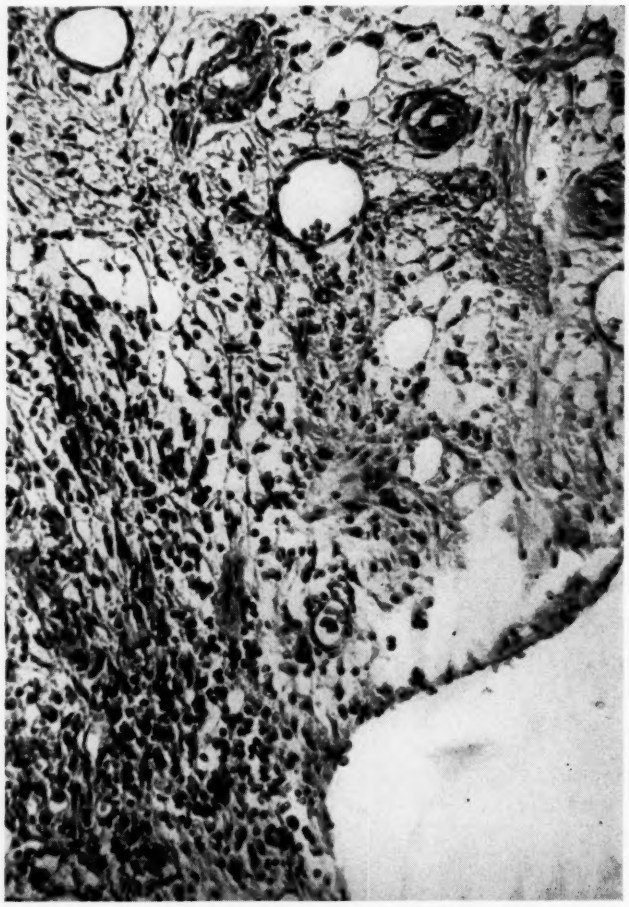

Fig. 9 (Case 3).—Photomicrograph (high magnification) from one corner of the lesion adjacent to the wide veins seen in Fig. 8. Note the delicate vascular connective tissue and the infiltration of round cells and a few histiocytes.

cept for a nontender elevation measuring 3 × 5 cm. on the medial aspect of the left tibia. The blood count showed 11,000 white cells per cubic millimeter, with 62 per cent polymorphonuclear leukocytes. Roentgenographic study of the left tibia revealed an oval rarefied area measuring 0.8 cm. in diameter in a zone of perifocal sclerosis (Fig. 13).

With the patient under general anesthesia, a wide segment of bone measuring 6 × 4 × 2 cm. was removed. The periosteum was described as thick and indurated. The tibia was saucerized and a medullary trough was established. The wound was closed and a cast applied. Recovery was uneventful.

Microscopic study of the bone showed it to consist of densely trabecular and compact cortical lamellar bone. In the trabecular areas there were fat marrow and edematous connective tissue. At one point there was a sharply circumscribed oval area composed of a matrix of osteoblastogenic mesenchyme and multinucleate giant cells in which there were trabeculated masses of osteoid tissue in various stages of calcification (Fig. 14). In some areas the matrix appeared to be more fibrillar and contained numerous small vascular channels and an infiltration of small round cells.

Case 6.—G. R., a 13-year-old boy, was admitted

to the Jewish Hospital with the chief complaint of pain and swelling of the left leg of one year's duration. The swelling remained unchanged, but the pain was becoming progressively worse; it was sharp and lancinating. The past and family histories were not unusual. There was no history of trauma or infection.

Physical examination revealed no general changes. On the anterior aspect of the left leg there was a rounded mass which appeared to be associated with the underlying tibia. This was tender to pressure. The results of chemical blood tests and of the blood Wassermann test were negative. Study of the peripheral blood showed leukocytosis (21,800 white cells per cubic millimeter). The differential count revealed 82 per cent polymorphonuclear leukocytes.

With the patient under general anesthesia, a segment of dense bone was removed from the middle portion of the tibia. Roentgen examination of the segment revealed the central radiolucent oval area that had been noted in the preoperative tibial roentgenogram.

Fig. 10 (Case 4).—Roentgenogram of the tibia showing some widening of the bone and a marked increase in density of the upper third of the bone. A small radiolucent area is present on the anterolateral aspect of the bone where the periosteum is elevated.

Microscopic study of the bone segment excised from the tibia showed it to consist predominantly of mature, cortical lamellar bone covered by a narrow layer of fibrous periosteal connective tissue. In places bands of this connective tissue, accompanied by large-calibered vessels, dipped into wide Volkman's canals. Many of the haversian canals were wide and contained delicate vascular connective tissue. Towards the endosteal side of the cortex there was a sharply circumscribed porotic area. In the haversian canals adjacent to the rarefied zone there were large-calibered, thick-walled blood vessels. The bone was less dense in this area, and the medullary spaces were wider. The oval area consisted of a substratum of vascular osteogenic connective tissue in which were seen osteoid tissue and primitive and lamellar bone (Fig. 15). Osteoblasts arranged themselves in a continuous single chain on the surfaces of some of the trabeculae. Many inactive osteoclasts were also seen. In the center of the lesion there was an irregular mass of homogeneous pink, partially trabeculated and calcified osteoid tissue. Adjacent to this were numerous smaller groups of interrupted trabeculae of calcified osteoid tissue and primitive bone. There were also seen on the periphery of the lesion some islands of lamellar bone. The cortical bone adjoining the osteoma ended abruptly and the borders of the trabeculae facing the tumor were sharply serrated, indicating a past period of active lacunar resorption.

CASE 7.—M. H., a 22-year-old man, was admitted to the hospital complaining of pain in the left knee, of six months' duration. At first it was sharp, brief and worse at night. It did not interfere with his activity. One month before admission it became more pronounced, and it was aggravated on motion. Some swelling of the knee was then noted. There was no history of trauma.

On physical examination only the local findings were noteworthy. There was swelling of the left knee. No tenderness was found. Flexion was normal. Extension was limited to 170 degrees; it was painful past 150 degrees. The clinical impression was that of osteochondritis dissecans.

Roentgen examination was made before admission of the patient to the hospital. The plates were not available for this study.

With the patient under general anesthesia, the knee joint was opened and a loose, vascular fragment of bone, described clinically as a sequestrum, was removed from the outer aspect of the medial femoral condyle. The underlying area of softening was curetted. It was thought to be a case of osteochondritis. Adjacent to the lesion an area of articular cartilage about 2.5 cm. long was replaced by connective tissue. A plaster cast was applied

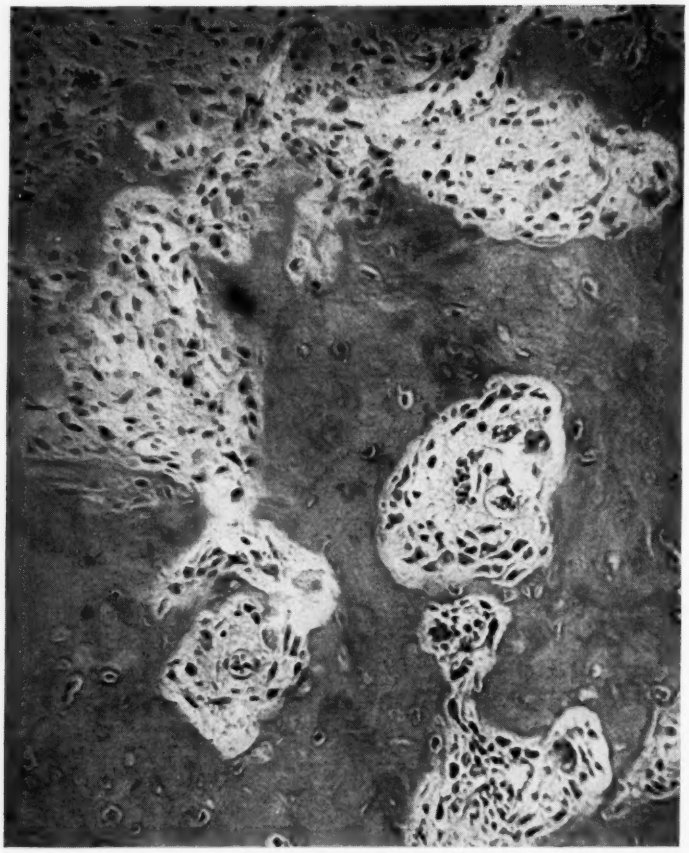

Fig. 11 (Case 4).—Photomicrograph (high magnification) showing osteoid tissue lying in a well defined matrix of embryonal osteogenic connective tissue.

after closure. Recovery was uneventful, and the symptoms vanished. A culture taken from the removed tissues was sterile.

Microscopic examination of the bone fragments showed them to consist of an osteoblastogenic, vascular stroma containing many multinucleated giant cells. In the stroma there were large masses of osteoid tissue in various stages of calcification and some primitive, partly calcified bone trabeculae. The latter were in the process of active alteration. The central portion of the osteoid mass appeared to be less dense than the remainder (Fig. 16).

CASE 8.—B. P., a 28-year-old man, complained of pain in the region of the left ankle of seven months' duration. The pain began immediately after he had dropped a case of milk bottles on the member. It was of a boring nature, deep in the ankle; it recurred every four or five hours and appeared to be worse at night. It was relieved by aspirin. Activity did not affect it.

There was nothing unusual in the past history.

On physical examination the patient showed no local or general changes other than moderate tenderness just anterior to the left external tibial malleolus. Study of the peripheral blood showed 11,400 white blood cells per cubic millimeter, with 53 per cent polymorphonuclear leukocytes.

Roentgenologic examination of the left ankle revealed an increased density of the bone along the superior surface of the os calcis at its midposition. Within this area there was a round, less dense zone which measured about 1.5 cm. The im-

pression of the roentgenologic department was that of osteoperiostitis (Fig. 17).

With the patient under general anesthesia the involved segment of bone was excised. The pain disappeared immediately after operation, and the patient has remained well.

Microscopic examination of the excised segment showed it to consist of quiescent dense spongy and cortical lamellar bone. In the medullary spaces there was edematous, vascular fibrous marrow. In some places focal collections of round cells were evident (Fig. 18).

At one point in the bone there was an oval, sharply demarcated zone composed of a substratum of cellular, osteoblastogenic mesenchymal tissue in which there were intercommunicated and isolated trabeculae of osteoid bone. The trabeculae were largely arranged into small spongy masses which were calcified in the center. Between them, in some places, there was acidophilic substance enveloping the mesenchymal cells. No active apposition or resorption was noted (Fig. 19).

Immediately adjacent to this area and enveloping it there was a layer of larger trabeculae composed of primitive bone. Considerable appositional and osteoclastic activity was present here. The surfaces of the trabeculae which faced the central osteoid tissue were serrated and indicated previous lacunar resorption. The marrow cavities contained moderately cellular, edematous fibrous marrow. Many thick-walled vascular channels were noted. There appeared to be vascular continuity of the adjacent relatively normal hyperostotic bone with that of the osteoid area. It appeared that the primitive bone of the nidus was being resolved centrifugally and that osteoid tissue, which was replacing it, was again in the process of intramembranous reconstruction. There may exist a cyclic change in the nidus in some of these cases which consists of alternate intramembranous ossification and resorption. The adjacent bone reaction limits the spread of this process.

CASE 9.—I. S., a 14-year-old white boy, was admitted to the Jewish Hospital complaining of pain

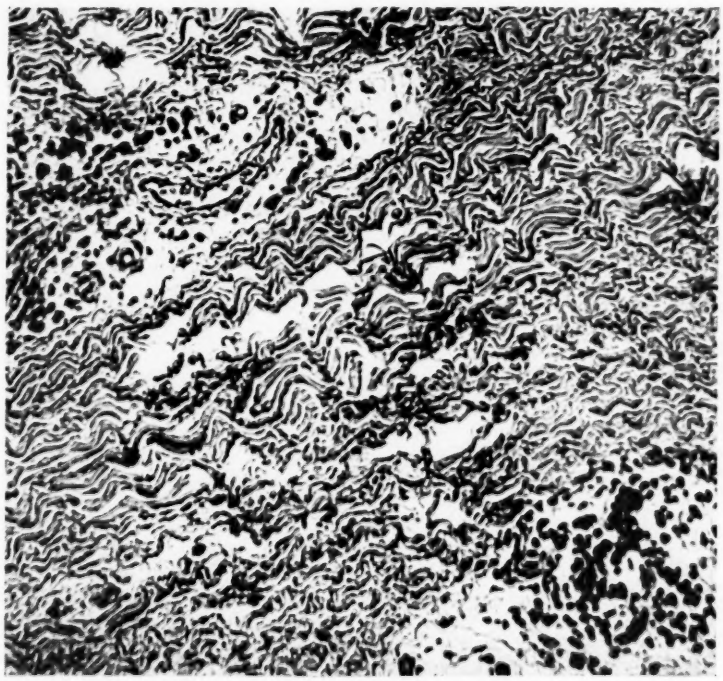

Fig. 12 (Case 4).—Photomicrograph (medium magnification) showing periosteum in which there are seen foci of perivascular round cell infiltration.

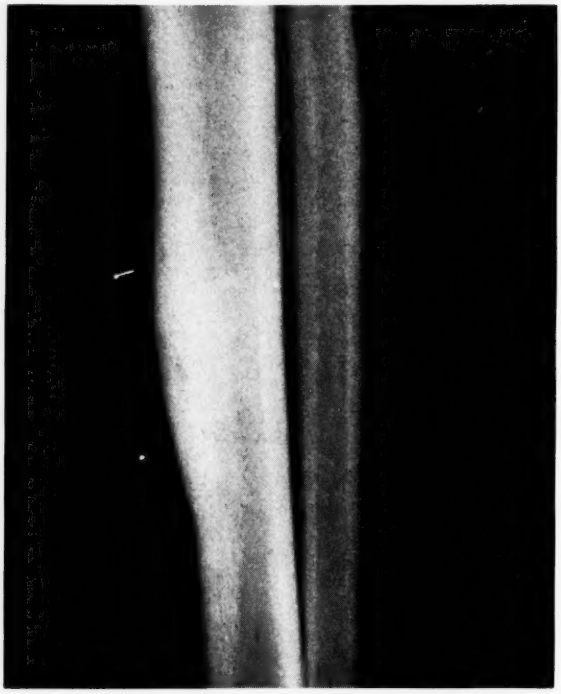

Fig. 13 (Case 5).—Roentgenogram showing indistinct oval rarefied area in the cortex of the tibia, surrounded by a zone of perifocal sclerosis.

along the right humerus of six weeks' duration. This was accompanied by pain on motion of the shoulder, especially after strenuous activity. The past and familial history were irrelevant. There was no history of trauma. Examination revealed no general abnormalities. Locally, in the region of the mid-third of the right humerus, there was a firm, indurated, tender area measuring 2 × 3 inches (5 × 7.5 cm.) in diameter. Complete blood chemistry study, including tests for calcium, revealed no abnormality. The Wassermann reaction was negative. The sedimentation rate was normal. There was mild secondary anemia. The clinical impression was that of sclerosing osteomyelitis (Garré).

Roentgen examination of the right humerus revealed an area of thickening and elevation of the periosteum along the shaft of the bone in its mid-portion. At about the center of the bone there was demonstrated a rarefied locule 1 cm. in diameter in a zone of extracortical calcification. In the lateral projection, definite "onion peel" was noted. This picture was suggestive of neoplasm. Whether this represented Ewing's tumor or osteoma could not be said with certainty (Fig. 20).

The patient was operated upon under general anesthesia. A muscle-splitting incision was made, through which a section of bone measuring 4 × 5 cm. was chiseled out. This contained the rarefied locule noted previously on the roentgen film. The wound was closed, and a plaster of paris spica was applied. The patient was then completely free of symptoms.

Microscopic examination of the sections consisted of hyperostotic areas of spongy bone. The trabeculae were long and wide; they were arranged in varied fashion. In some areas they were parallel to the surface of the bone, in others they were in part perpendicular and in part tangential to the long axis of the bone. The trabeculae consisted of mixed lamellar and primitive bone. The medullary spaces contained loose fibrous connective tissue marrow. In the center of the hyperostotic mass there was an oval, sharply demarcated porotic area measuring 1.2 cm. in diameter (Fig. 21). This consisted of

a substratum of cellular, vascular, osteogenic connective tissue. In the center there was a large irregular mass of osteoid tissue which was irregularly calcified. Surrounding this area there was a zone of smaller masses of osteoid tissue and irregularly scattered interconnecting trabeculae of primitive reticular bone. On the surfaces of some of these trabeculae there were occasional seams of osteoblasts and multinucleated giant cells (osteoclasts) in lacunae. Towards the periphery of the oval area the mesenchymal substratum merged with fibrous connective tissue marrow which extended into the marrow spaces of the surrounding hyperostotic bone. It contained numerous large and small vascular channels. The lamellar trabeculae adjacent to the main lesion showed more bone alteration than elsewhere in the focally sclerosed zone. There was moderate central and peripheral osteoclastic resorption and beginning apposition of new bone on the surface of the trabecula. The surfaces of the trabeculae facing the nidus were serrated.

CASE 10.—W. S., a 20-year-old man, was admitted to the Jewish Hospital complaining of pain in the right arm, extending from the shoulder down to the wrist. This had begun one and one-half years before, with pain in the mid-arm, while the patient was lifting a bale of material. Some time later it

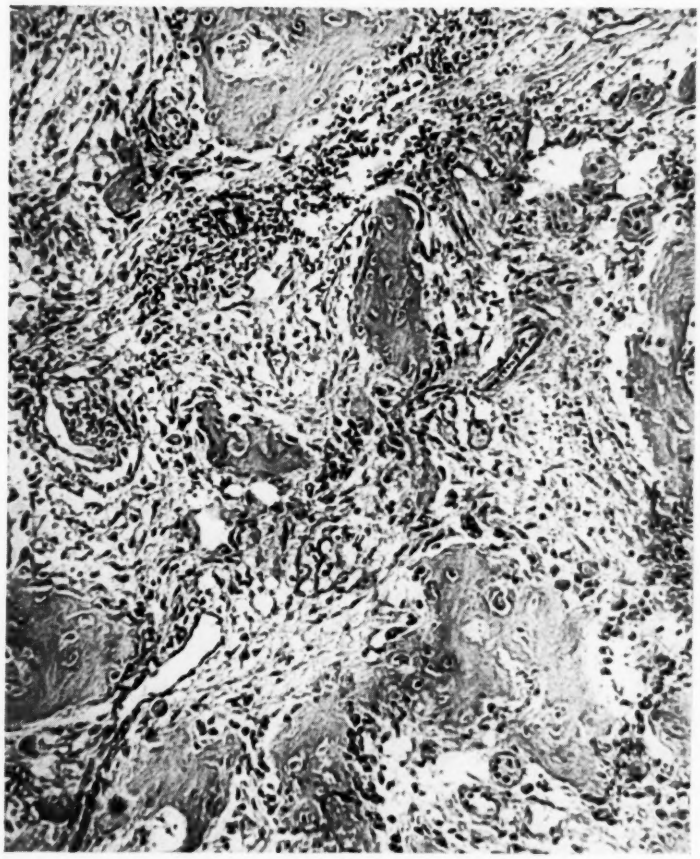

Fig. 14 (Case 5).—Photomicrograph (high magnification) of one portion of the osteoid osteoma showing osteoid trabeculae in a somewhat more fibrillar and edematous matrix. Note numerous vascular channels and round cell infiltration.

Fig. 15 (Case 6).—Photomicrograph (low magnification) showing cross section of a portion of the osteoid nidus.

began to radiate upward and then down to the wrist. It varied from sharp to dull and was relieved by taking aspirin. No swelling was noted.

Physical examination showed nothing unusual except some swelling on the posterolateral aspect of the right axilla. The peripheral blood study showed 12,500 white blood cells per cubic millimeter and 63 per cent polymorphonuclear leukocytes.

Roentgen examination of the right humerus demonstrated an area of density at the upper third of the humerus in its inner aspect. In the midportion there was an oval radiolucent area measuring 1 cm. in diameter (Fig. 22).

With the patient under general anesthesia a block of bone about 2½ inches (6.2 cm.) long and 1½ inches (3.7 cm.) wide was resected from the humerus in the region of densification.

Microscopic study of the bone section showed it to consist of cortical lamellar bone, partly of dense spongy nature and partly normal compacta. In the middle of one portion of the cortex there was a long and irregular zone which consisted of small intercommunicating trabeculae of osteoid and young fibrous bone. In the very small marrow spaces there were sclerogenous connective tissue and occasional osteoclasts. The primitive bone trabeculae merged with the surrounding larger lamellar bone trabeculae. Towards the endosteal side of the lesion the lamellar bone was undergoing central and peripheral resorption, and active new bone deposition was seen on the surfaces of the trabeculae. The marrow spaces in this area were wide; they contained fibrous connective tissue marrow.

In another section the osteoid lesion was seen to extend into the spongiosa of the bone. In this area the osteoid tissue predominated. Here, too, there were a moderate number of osteoclasts and little perifocal bone sclerosis (Fig. 23).

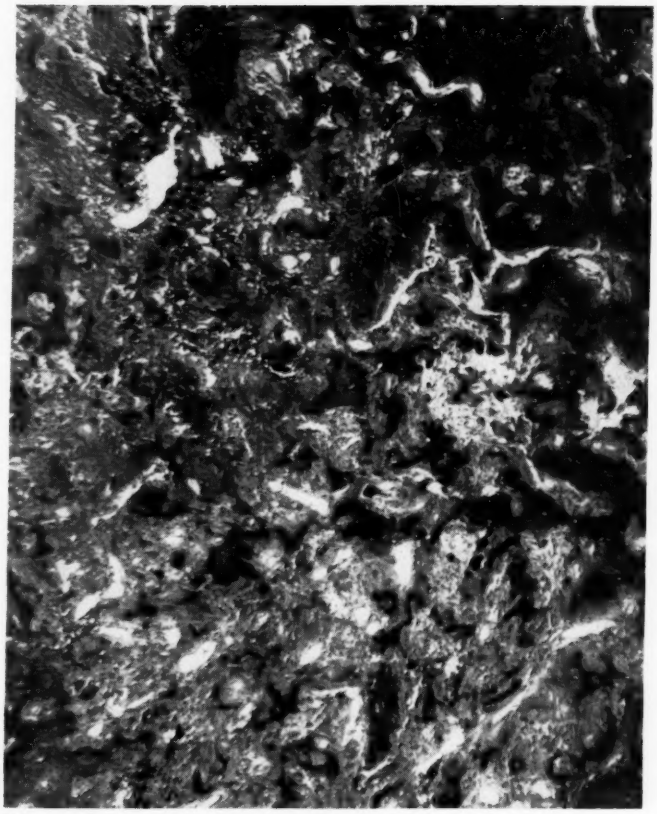

Fig. 16 (Case 7).—Photomicrograph (low magnification) showing a cross section of a portion of the osteoid nidus. The central portion appears to be less densely calciñed.

CASE 11.—S. de F., a 12-year-old boy, was admitted to the Jewish Hospital complaining of an abnormal gait of six months' duration. The onset coincided approximately with an appendectomy for chronic pain in the right lower abdominal quadrant. Shortly after being discharged from the hospital he noted some stiffness of the lower dorsal and lumbar portions of the spine, a "crooked" gait and an elevation of one shoulder. For a few weeks before admission to this hospital there had been some pain and discomfort in the aforementioned area. This had been worse on standing and walking and relieved on lying down. One sister had died of pulmonary tuberculosis.

Physical examination revealed the patient to be well developed, well nourished and apparently not acutely ill. The temperature, pulse and respiration were normal. On standing the back was held rigid and lumbar lordosis was seen. There was marked tenderness over the lower two thoracic and upper two lumbar spinous processes. The erector spinae muscles, especially on the left, were spastic. The abdomen was scaphoid and somewhat spastic in the lower quadrants, especially on the right. Tenderness and cutaneous hyperesthesia were present in the right lower quadrant. There were also cutaneous hyperesthesia and increase of muscle tone anteriorly and posteriorly over the ninth dorsal to the first lumbar segment. The patient was unable to sit up with the legs fully extended. Straight leg raising was normal. Patrick's sign was positive on the right side. Backward extension of the lower extremity was limited on the right, but it was full when the leg was abducted at the same time. The

Fig. 17 (Case 8).—Roentgenogram showing a round radiolucent area in a zone of increased density in the midportion of the upper surface of the os calcis.

clinical impression was that of osteomyelitis of the spinous processes. The Mantoux test (0.1 mg.) gave a negative result. Examination of the blood and of the urine revealed nothing unusual. Roentgen study of the dorsolumbar portion of the spine was reported as giving negative results. Subsequent review of the films revealed an oval area of rarefaction at the tip of the spinous process of the first lumbar vertebra (Fig. 24).

With the patient under general anesthesia, a 4-inch (10 cm.) incision was made over the lower two thoracic segments and the upper portion of the spine to the right of the spinous processes. The ligaments were puffy and the muscles grayish pink. The spinous processes and part of the transverse process of the lower two thoracic spines were excised. A culture taken from the operative field was completely negative. The impression was that of osteomyelitis of the spinous processes.

Microscopic examination of the excised fragments showed that one fragment consisted of a portion of cortical bone, to which were attached periosteum and a band of densely hyalinized connective tissue. The structure of the cortical bone appeared to be unchanged except for some widening of the haversian canals. The resultant spaces contained edematous, delicate connective tissue marrow and a sprinkling of myelogenous cells. Immediately underneath the periosteum at one point there was a circumscribed area composed of a substratum of cellular osteoblastogenic tissue containing many inactive multinucleated giant cells. Within this tissue there were interconnecting trabeculae of partially calcified osteoid tissue (Fig. 25).

Adjacent to the periosteum at one point there was seen striated muscle. In places the muscle fibers appeared small and atrophic and were replaced by connective tissue and fat cells. Local areas of polymorphonuclear leukocytic and round cell infiltration were occasionally seen. The blood vessels were thick walled and showed endarteritic changes (Fig. 26).

CASE 12.—K. G., a 21-year-old man, was admitted to the Jewish Hospital complaining of pain over the region of the lower thoracic spine of two and a half years' duration. The pain was intermittent, lasting for variable periods, and appeared to be entirely unrelated to general activity or motion of the spine. There was no history of trauma.

Physical examination revealed nothing of note. Locally there was point tenderness in the region of the tenth and eleventh thoracic vertebrae, about 2 cm. to the left of the midline. Adjacent sacrospinalis muscle spasm was present bilaterally. There was lower thoracolumbar scoliosis to the left. General neurologic examination gave negative results.

Laboratory studies revealed nothing unusual. The urine was within normal limits. Study of the peripheral blood revealed no significant abnormality. The Wassermann reaction was negative. The hematologic values for urea and sugar were normal. Manometric spinal tests and chemical studies of the spinal fluid gave normal results.

Roentgenograms of the vertebrae showed an osteogenic bridging between the inferior articular surface of the twelfth dorsal and the first lumbar vertebra as well as between the inferior articular surface of the first and second lumbar vertebrae on the left side. This was interpreted as representing ossification and calcification of the vertebral segments secondary to trauma or infection. There was also slight scoliosis to the right of the lumbodorsal portion of the spine, with the apex of the curve at the level of the first lumbar vertebra. Restudy of the roentgen films after operation revealed considerable ossification of the tissues adjacent to the left pedicle and lamina of the first lumbar vertebrae. Some rarefaction was seen in the center of the sclerotic area, in the region of the left transverse process (Fig. 27).

With the patient under general anesthesia, an incision was made over the twelfth thoracic and the first two lumbar vertebrae. The muscles were indurated and fibrotic; the laminae over the first lumbar vertebrae were rough and irregular. A curet struck a soft vascular area at the center of the lesion which was purple-red. This area was well curetted and the wound was closed. The impression was that of a giant cell tumor of the spine.

The microscopic report noted that the irregular fragments of bone showed a variegated picture

Fig. 18 (Case 8).—Photomicrograph (high magnification) showing vascular fibrous marrow and round cell infiltration in the medullary spaces of the excised spongy bone adjacent to the nidus.

In one area the specimen consisted of small, irregular trabeculae of calcified early lamellar bone. Active bone apposition and lacunar resorption were noted on the surfaces of the trabeculae. In the marrow spaces there was edematous fibrous connective tissue.

Adjacent to this hyperostotic area there was another, which consisted of larger, more widely separated lamellar bone trabeculae with similar but more edematous connective tissue marrow and with some round cell infiltration.

In another section there was a sclerotic area of lamellar bone, adjacent to which there was a sharply demarcated area consisting of a substratum of osteoblastogenic connective tissue and osteoid tissue. The osteoid tissue was in the form of irregular, partially calcified masses and some trabeculated areas. In the mesenchymal tissue surrounding the preosseous tissue there were multinucleated giant cells of varied size and shape.

Adjacent to one of the bone fragments there was a wide layer of dense hyalinized connective tissue in which were focal collections of round cells. Many thick-walled blood vessels were noted. There was also an area of striated muscle, fragmented and interrupted. The muscle fibers were atrophic in some places and hypertrophic in others. Large areas were replaced by connective tissue in which there were islands of muscle fiber. Occasional focal collections of round cells, plasma cells and histiocytes were seen (Fig. 28).

COMMENT

An abundant literature is accumulating on the subject of osteoid ostema. Its clinical, roentgenologic and morphologic manifestations have been well and unequivocally delineated; its etiology and pathogenesis, however, are still subject to conjecture and con-

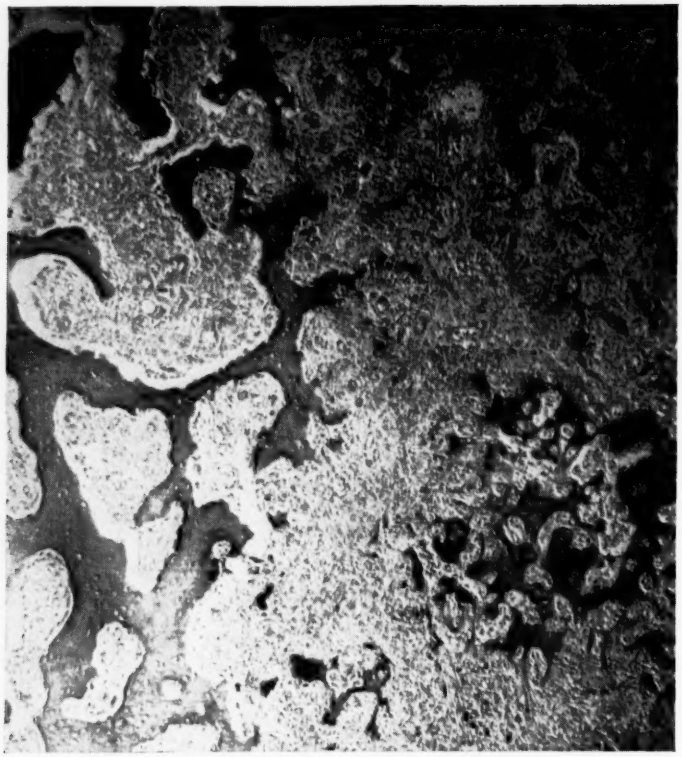

Fig. 19 (Case 8).—Photomicrograph (low magnification) showing cross section of a portion of the nidus of calcified osteoid tissue in a mesenchymal matrix and adjacent bone.

troversy. Most investigators embrace Jaffe's concept without reservation; they maintain that the lesion is a distinctive, slow-growing, benign tumor of the bones and they endorse the term "osteoid osteoma." Other authors maintain that many contradictory facts must be explained before a true evaluation can be made of the evolution of this disease. A third group of contributors to the literature categorize this condition as a localized bone infection in the nature of either cortical bone abscess or sclerosing nonsuppurative osteomyelitis. It appears that further evaluation of the literature and a more intensive study of future cases is necessary in order to arrive at a final conclusion.

Prior to the publication of Jaffe's first paper on this subject in 1935 the lesion was described in the literature by a number of authors as a unique type of inflammatory disease of bone. In 1924 Henderson expressed the opinion that it represents sclerosing nonsuppurative osteomyelitis or chronic sclerosing osteitis. In 1927 Heine described a typical case and concluded that he was dealing with a nonspecific localized infection which had metastasized from an inflammatory focus elsewhere in the body. In 1929 and subsequently in 1938 Phemister analyzed some typical cases; he decided that the lesions were characteristic of localized low grade infections of bone in healing stages. Hitzrot (1930) set forth a characteristic case of what he thought was sclerosing osteomyelitis. Bergstrand (1930) also reported 2 cases, stating that in his opinion the lesions were neither inflammatory nor neoplastic, but developmental aberrations of a diseased embryonal anlage. In 1933 Wishner termed the lesion

sclerosing osteomyelitis of Garré. Many other German and French authors described cases in which the clinical and roentgen pictures were typical of the condition presented in this paper. They also interpreted the condition as chronic inflammation of bone.

Subsequent to the publication of Jaffe's paper in 1935, Mondolfo described 3 cases of osteoid osteoma, comparing them with 4 instances of inflammatory disease of spongy bone. The histopathologic pictures of the two types of lesion were so analagous that he deduced that they represented different stages of inflammation. In 1940 Ottolenghi reported a typical case of osteoid osteoma. There was indisputable histologic evidence of chronic inflammation in the nidus, i. e., edema, plasma cells, lymphocytes and histiocytic cells. Brailsford (1942) discussed in some detail 6 cases of Brodie's abscess. In 5 of these the clinical and roentgen picture was similar to that of the entity we now term as osteoid ostema. In 3 instances the microscopic picture was also said to be typical. In 2 of the cases beads of pus were observed, and in 3 of them Staphylococcus aureus was cultured from the lesion. Brailsford also came to the conclusion that osteoid osteoma was a stage in the process of inflammation of bone.

In 1943 Brown and Ghormley searched the records of the Mayo Clinic for a ten-year period, limiting their investigation to single cortical lesions of bone which ran a benign course and were subjected to surgical excision. They found 26 cases under the classification of Brodie's abscess and 5 under Garré's disease. Of the lesions in the former group, 17 were located in the tibia. The symptoms were of less than one year's duration in 11 instances, one to six years in 8 others and up to thirty-five years in the remainder. Redness was rarely seen. Fourteen patients were cured by surgical eradication of the lesion. Chronic inflammatory elements (round cells, giant cells) were observed in 10 cases. Cultures yielded Staph. aureus in 2 instances and micrococcus in 2 others. Roentgenographic films were characteristic of osteoid osteoma in all the cases. The authors concluded that there was no evidence of new growth but that an infection was present, due either to trauma or to distant primary foci. Since microscopic study was not emphasized, these cases could not all be accepted as actual instances of osteoid osteoma.

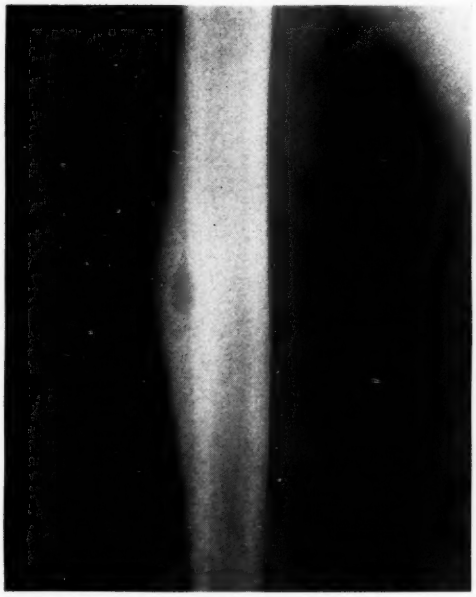

Fig. 20 (Case 9).—Roentgenogram of the right humerus, showing an oval radiolucent area between the surface of the cortex and the adjacent periosteal new bone. The latter causes widening of the bone at this point. Note suggestion of onion peel appearance in the upper half.

In a more recent paper (1949) from the Mayo Clinic (Jackson, Dockerty and Ghormley) a review was made of the collected records of conditions previously diagnosed as sclerosing osteitis, Brodie's abscess, solitary cortical abscess, localized osteitis fibrosa, osteofibroma and osteoma. In 48 of the 150 culled cases the clinical and roentgen features were typical of osteoid osteoma. Microscopic examination confirmed only 20 of the latter as belonging to this group. The only differentiating factor between these 20 cases and some of the others was the presence of chronic inflammatory changes in the latter. This was considered by the authors as inconclusive but substantiating evidence for the neoplastic origin of osteoid osteoma.

When the observations of the various competent investigators is considered, the evidence is so finely balanced that it is not possible to draw a final conclusion as to the nature of the lesion.

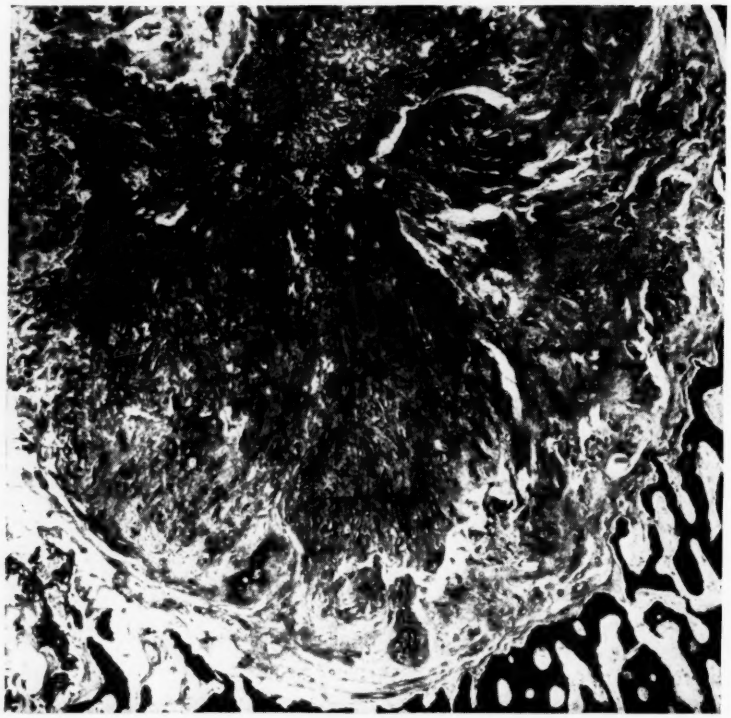

Fig. 21 (Case 9).—Photomicrograph (low magnification) shows a cross section of the nidus and the adjacent sclerotic bone.

It may therefore be pertinent at this time to reconsider some of the clinical and morphologic features that characterize the condition now popularly known as osteoid osteoma and to discuss them in terms of their possible relation to its etiology and pathogenesis.

Age incidence yields no clue as to the origin of the disease. Mondolfo maintains that persons in the years of life when this lesion is common, i.e., from 10 to 25, are more characteristically affected by inflammation than by tumor formation. It must be conceded, however, that solitary growths are the commonest neoplasms of the skeleton, and they develop chiefly in the young. No specific significance can be attributed to the fact that the age incidence for the two conditions coincide.

The symptom of pain in osteoid osteoma antedates all other signs and symptoms by weeks or months. In tumor formation pain is, as a rule, a late symptom, since it is essentially due to the mechanical pressure of expanding tissue on the adjacent encasing tissues. In infflammatory disease pain is an early manifestation. If one considers osteoid osteoma a new growth, it is difficult to explain the fact that despite the failure of this lesion to expand beyond its usual size of 1 cm. the pain becomes progressively worse. Some authors contend that the nocturnal nature of the pain and its relief on administration of salicylates are also more indicative of inflammatory disease than of tumor.

Trauma is mentioned in the anamnesis in 30 to 40 per cent of cases of osteoid osteoma. It has been considered by most authors to be purely coincidental and of no significance. It is premature to dismiss thus casually an incident

so frequently associated with a disease. The fact that a latent period exists between the trauma and the onset of symptoms does not exclude the trauma as an initiating factor. It is well known that trauma is an important factor in bone infections in the young; its relation to new growths is still conjectural. It may also be relevant to consideration of the causation of this disease that it occurs predominantly in the lower extremity and that it is distinctly more prevalent in the male than in the female. This parallels the conditions in inflammatory disease of bone in children and adolescents, in which trauma is a significant factor.

The presence of joint swelling and stiffness, limitation of motion and contractures, as well as changes in the musculature adjacent to the lesion, such as hypertonus, atrophy and spasm, are more apt to be associated with inflammatory disease of bone than with a minute static growth. The same may be said of local tenderness, which is commonly observed in cases of osteoid osteoma, and of local heat and redness, which are seen only occasionally.

Roentgenographic differentiation between inflammation and osteoid osteoma has apparently been difficult. Many of the "proved cases" have been and still are being interpreted as chronic inflammatory disease. Brailsford observed, "The resemblance to the radiographic appearance of certain bone abscesses is so strong as to cast doubt on any other interpretation." It has also been correctly asserted that no benign tumor of bone has been known to produce contiguous perifocal sclerosis.

It has been stressed by many that in this condition there has been no palpable clinical, bacteriologic or morphologic evidence of inflammation. None of the patients described have ever been known to have chills, fever or tachycardia. In most instances the study of the peripheral blood has shown no unusual changes. It may be said significantly, however, that no systematic study has been attempted to determine this factor at different stages of the disease. In only 3 of our cases were sedimentation rates observed. In 2 of them the rate was within normal limits; in the third it was 50 mm. in one hour. There was no apparent explanation for this elevation in rate. In 4 cases there was moderate to high, leukocytosis (12,500 to 21,800) white cells per cubic millimeter of blood and the polymorphonuclear leukocyte count ranged up to 95 per cent. Closer observation of these factors in the cases to be studied in the future would perhaps shed some light.

Bacteriologic studies of patients with osteoid osteoma have been sporadic and unorganized. Blood cultures and virus studies have not been made, and cultures of the lesion and adjacent bone have only been done in some cases. Most of the latter have yielded negative results. In the first case reported by Jaffe in 1935 a diptheroid bacillus was observed on culture of swabbings of the bone removed at operation. In 1940, 2 of his patients yielded cultures of Staph. aureus. He assumed that these were all contaminants of extraneous origin. Brailsford was able to isolate Staph.

Fig. 22 (Case 10).—Roentgenogram of the upper third of the right humerus, showing an oval radiolucent zone in an area of perifocal densification.

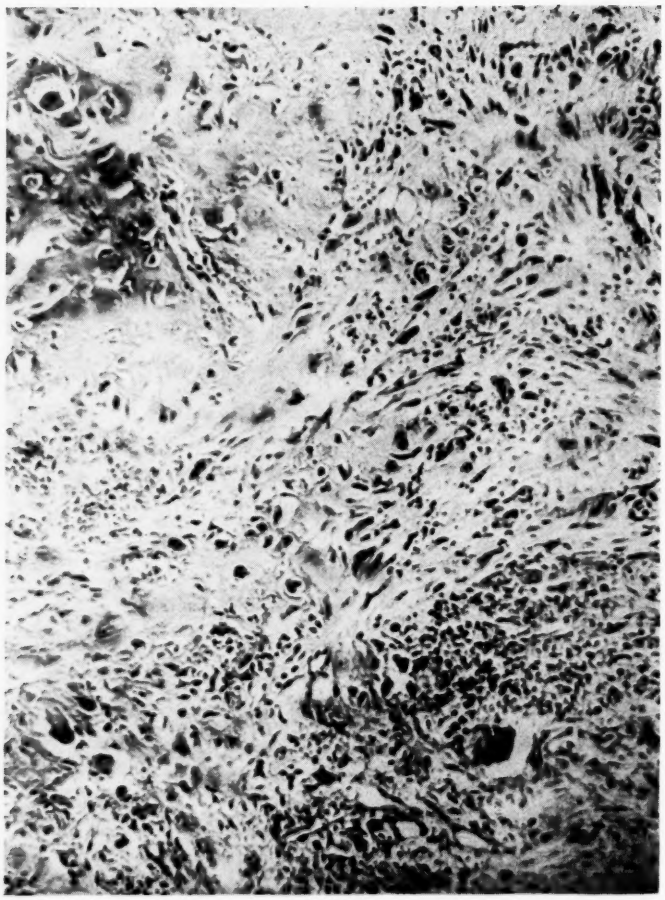

Fig. 23 (Case 10).—Photomicrograph (high magnification) showing osteoid tissue in a matrix of mesenchymal tissue and some osteoclasts.

aureus in 3 of the 6 cases of what he considered to be Brodie's abscesses even though the histologic morphologic picture coincided with that which is considered typical for osteoid osteoma. In the present series of cases, two cultures were attempted; both gave negative results. It is apparent that cultures made from areas of low grade chronic infection of bone may yield positive results in only a small percentage of cases. It cannot be presumed that the positive cultures that were obtained were merely contaminants until a complete and sequential study has been made of many of the cases to be observed in the future. This should include blood culture examinations at different intervals, as well as bacteriologic analysis of the nidus, the contiguous bone and the soft tissues. The reason for inclusion of soft tissues in the bacteriologic examination will soon be explained.

The weakest link in the hypothesized inflammatory origin of osteoid osteoma has been the general absence of any cellular elements of inflammation. Only Ottolenghi, Brailsford and

Brown and Ghormley have maintained that such histologic changes were demonstrable in their cases. The remaining authors advocating the inflammatory origin of this condition merely inferred that in long-standing infections of bone these elements are not necessarily pathognomonic. Phemister postulated that attenuated low grade bone infections exist from which bacteria cannot be grown or can be grown only occasionally and little or no microscopic evidence of inflammation is present. No mention is made of microscopic examination having been made in any of the cases in the literature of the soft tissues, i.e., periosteum or muscle, adjacent to the bone lesion. Only Voshell and Appleby observed that in their case there existed muscle changes near the affected bone in the form of myositis ossificans, hemorrhage and round cell infiltration; Hamilton described edema and congestion of the tissues adjacent to the lesion when it lay near the cortex. Other authors have mentioned thickening and edema of the periosteum in such cases. In the 12 cases described in this paper there was histologic evidence of chronic inflammation within or adjacent to the nidus in 3 instances. In 3 other cases we observed round cell infiltration and other elements of chronic inflammation in the periosteum inadvertently removed with the bone specimen. Similarly, in the 2 instances in which muscle tissue accompanied the specimen there was definite inflammatory change within this tissue. Whether these alterations of the soft tissues are primary or secondary is conjectural. In the further study of osteoid osteoma it appears that adjacent periosteum and muscle should be thoroughly investigated.

A number of authors have described clinical changes in the joints adjoining the bone affected with osteoid osteoma. This was a common observation. Sherman demonstrated histologically that in 2 of his cases of osteoid osteoma the adjacent joint showed nonspecific inflammatory synovitis, which subsided completely with excision of the osteoma. Inflammation of joints is not uncommonly induced by foci of infection in the metaphyses of long bones not directly involving the joints. The joint is spontaneously restored to normal on elimination of the focus of infection. Although similar reactions of joints are occasionally

Fig. 24 (Case 11).—Roentgenogram showing an oval area of radiolucency at the tip of the spinous process of the first lumbar vertebra. No perifocal thickening is seen.

cited in association with noninflammatory bone lesions in the metaphysis, they are uncommon.

The elements visualized in the histomorphologic picture of osteoid osteoma, namely the osteoblastogenic connective tissue matrix, osteoclasts, osteoid tissue and atypical bone trabeculae, were in no way identifiable as neoplastic. In the majority of cases the preosseous mesenchyme underwent alteration through the deposition of acidophilic material in the interstices of the matrix, with resultant formation of osteoid tissue. This then became calcified and was resorbed and replaced by atypical primitive bone. This process of intramembranous ossification is not peculiar to this lesion; it is basically a phase in the normal ossification of growing bone, and it is also seen in various stages of repair of injured and inflamed bone, in heterotopic ossification, in some osteomas of the skull, in osteitis deformans and in other fibro-osseous dysplasias. In some of these conditions the mature bone cells appear to under-

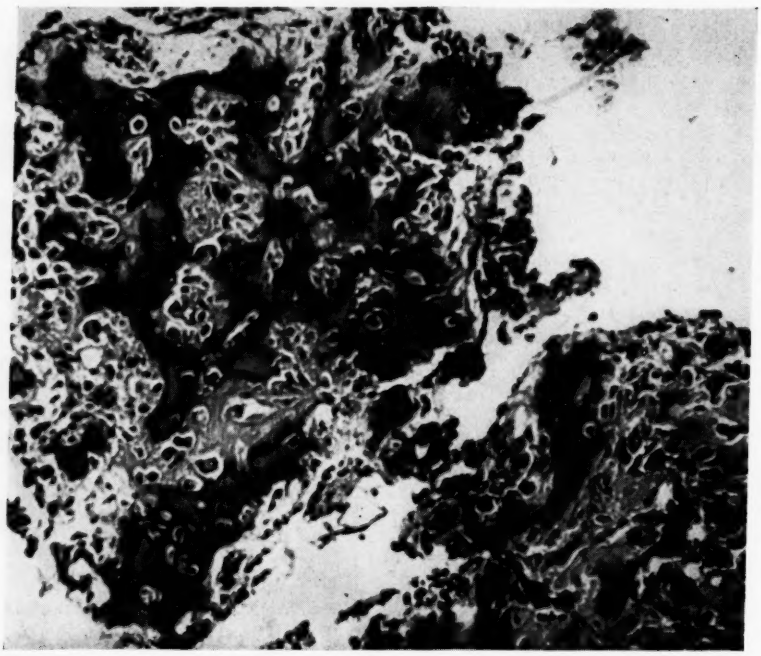

Fig. 25 (Case 11).—Photomicrograph (moderate magnification) showing cross section of a portion of the nidus consisting of calcified osteoid tissue in an osteoblastogenic matrix and some giant cells.

go metaplasia; there is a solution of the inorganic bone substance and a reversion of the osteocytes to their mesenchymal status. Since cells derived from mesenchyme are intermutable, they may redifferentiate into any of the sclerogenous elements; i.e., fibroblasts, osteoblasts, osteoclasts, chondroblasts, etc. Thus, any one of these elements or all of them may be observed during the reparative processes in bone. In osteoid osteoma, osteoid tissue and osteoclasts are predominant; in only 1 case (cited by Geschickter and Copeland) was there an intermediary cartilaginous phase.

There are other morphologic features which are inconsistent with the conception of osteoid osteoma as a neoformation. In cortical lesions the nidus is sharply demarcated by the surrounding bone, but there is no limiting capsule. On the contrary, the connective tissue on its outer aspect often merges imperceptibly with that of the marrow spaces in the perifocal zone. Furthermore, there has been observed in some of our own cases and in some of the cases reported by Bergstrand and others that a continuity often exists between the lamellar bone of the perinidal area and the atypical trabeculae of the nidus. There also appears to be a vascular continuity of the two zones. Another significant observation in some cases was the presence of partially resorbed lamellar trabeculae both in the connective tissue and in the osteoid zones of the nidus. It is difficult to reconcile the neoplastic origin of this condition with the presence of residual inclusions of lamellar bone in the lesion.

Only a rough concept exists as to the sequential evolution of osteoid osteoma from the various morphologic patterns observed. Jaffe postulated in 1945 that the condition was initiated through the invasion of bone by vascular elements from the vascular canals producing a creeping resorption. The bone in this area was replaced by osteogenic connective tissue, which was carried on the walls of the vessels. The

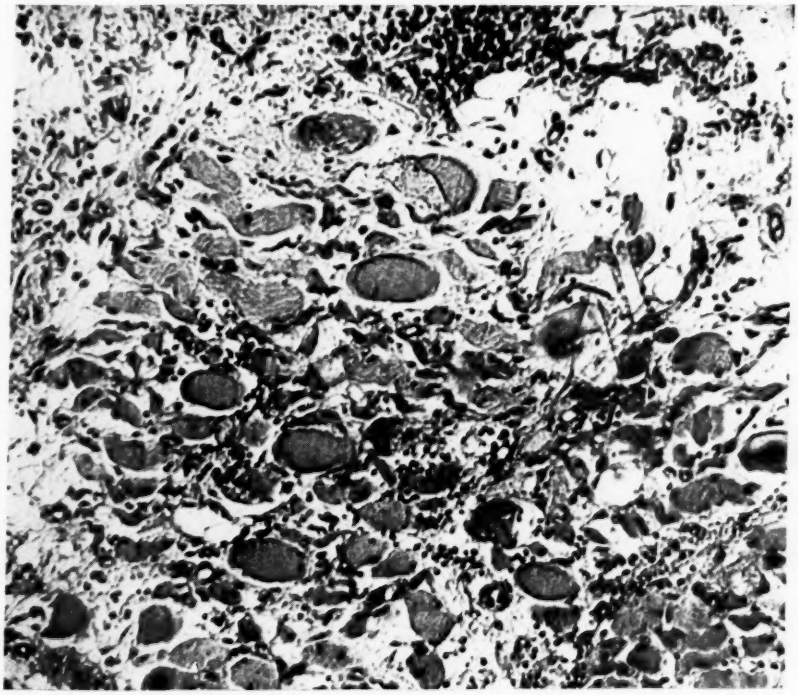

Fig. 26 (Case 11).—Photomicrograph (high magnification) showing an area of striated muscle unintentionally removed with the bone tissue in this case. Polymorphonuclear and round cell infiltration is observable as well as edema and degenerative changes of the muscle fibers.

connective tissue was then replaced by atypical bone. Concomitantly there was deposition of periosteal new bone of normal architecture. In this way there appeared a delimited area composed of dense trabeculae of atypical bone with few residua of normal bone. In the subsequent phases of the disease this is said to be largely replaced by vascular osteogenic connective tissue in which there is formed osteoid tissue. The latter phase is the one in which the lesion has most often been observed clinically.

The initial stages have not been observed in morphologic studies of osteoid osteoma, and it is conjectural whether they correspond to the foregoing description. It is evident, however, from observation of our own cases that concentric lacunar absorption does take place originally. This is confirmed by the presence of the serrated borders on surfaces of the trabeculae of the lamellar bone which face the osteoid nidus. The nature of the stimulus for this process is obscure, as is the reason for its limitation to an area 2 cm. or less in diameter. It is said by some authors that the restriction in growth may be due to the confining influences of the compensatory sclerosis adjacent to the nidus. This does not explain instances in which the lesion occurs in the spongiosa of bone where perifocal sclerosis is limited or even absent.

It has been observed in most of the cases that there is constant alteration of the tissues in the nidus, consisting of alternate construction of osteoid and atypical bone and resorption of these elements. The cycles may go on at different intervals or concomitantly, thus yielding a variegated arrangement of tissues in the same lesion. The alteration appears to go on mostly from the center of the lesion outward, leaving in some instances a circle of atypical bone on the periphery. Whether this cycle keeps on

Fig. 27 (Case 12).—Roentgenogram showing osteogenic bridging between the twelfth dorsal and first and second lumbar vertebrae and some ossification of adjacent tissues. A circular area of rarefaction is seen in the center of a sclerotic area in the region of the left transverse process of the first lumbar vertebra.

indefinitely or whether the focus ultimately merges into another phase of sclerosing osteitis or ossifying periostitis cannot as yet be stated. The nidus has never been seen to invade the surrounding tissues, nor have the perifocal tissues been observed to obliterate the nidus.

SUMMARY

The clinical, roentgenologic and pathologic features in 12 new cases of "osteoid osteoma" are presented. The etiology and pathogenesis of this disease are discussed in the light of the reviewed literature and the study of these cases. The weight of evidence appears to favor the concept that this lesion is a unique phase of chronic osseous inflammatory processes rather than a neoplastic change. It is proposed that, if this contention is conclusively proved and accepted after further study of future cases, the appellation "osteoid osteitis" be used to designate this condition.

RÉSUMÉ

On présente les caractéristiques cliniques radiographiques et pathologiques de 12 nouveaux cas d'ostéome ostéoïde. L'étiologie et la pathogénie de cette maladie sont discutées à la lueur des articles passés en revue et des études de ces cas. Il semble bien que l'on doive arriver à la conception que cette lésion est la phase unique d'un processus inflammatoire chronique osseux, plutôt que d'une évolution néoplasique. On proposa que, si cette manière de voir est véritablement confirmée et acceptée après une étude approfondie des cas futurs, l'appellation "ostéoïde ostéitis" soit employée pour désigner cet état.

RESUMEN

Se estudian los aspectos clínico, roentgenológico y anátomopatológico de 12 nuevos casos de "sarcoma osteoide." A la luz de la literatura estudiada y del examen de estos casos se estudia la etiología y patogenia de esta enfermedad. Los datos existentes parecen favorecer el concepto de que esta lesión representa una fase única de un proceso óseo inflamatorio crónico más que una alteración neoplásica, proponiéndose que si se comprueba de modo concluyente este aserto y llega a aceptarse, después de estudiar los casos que se presenten en el futuro, se emplee el término de "osteitis osteoide" para denominar este proceso.

RIASSUNTO

Descrive gli aspetti clinici, radiologici e patologici di 12 nuovi casi di "osteoma osteoide." Discute l'etiologia e la patogenesi della malattia in base ad una revisione della letteratura ed all'osservazione di questi casi. La conclusione piu' appropriata e' quella che non si tratti di un vero processo neoplastico, ma di una speciale fase di un processo infiammatorio cronico. Se l'esame di altri casi confermera' questa conclusione, sara' opportuno sostituire il termini di "osteoma osteoide" con quello di "osteite osteoide."

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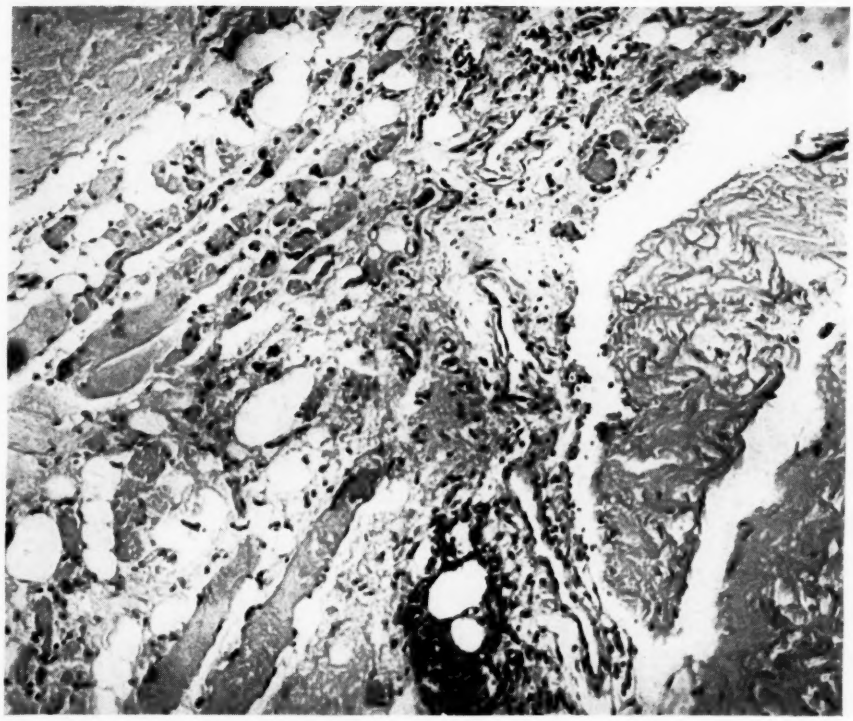

Fig. 28 (Case 12).—Photomicrograph (medium magnification) showing an area of striated muscle fragmented, interrupted and replaced by connective tissue. The muscle fibers are of varied size, and foci of round cell infiltration are seen.

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Transgastric Pancreatocystogastrostomy

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THE pathogenesis of pancreatic cysts is still controversial. Various theories have been put forward, ascribing the cysts to defective development of acini or ducts, obstruction due to calculi or annular scar formation, tumors, sterile or infected emboli, inflammatory processes in the gallbladder or the pancreas, parasitic infestation and trauma.[1]

Pseudocysts, it is generally agreed, are secondary to trauma or inflammatory processes in the gallbladder or the pancreas.[2]

Ballin and Saltzstein[3] reported a case of pancreatic cyst following cholecystectomy. It has been suggested that trauma is overemphasized.[4] Mahorner's series[1d] showed 17 per cent due to trauma; Zieman[5] quoted 20 to 35 per cent; Meyer and his associates[6] reported 51 per cent. It is reasonable to suppose that a sharp blow against a relaxed abdominal wall might crush the body of the pancreas against the lumbar vertebrae over which it lies. Boyd[7] stated that after an injury to the pancreas due either to trauma or to inflammation, secretion escapes from the traumatized area into the lesser peritoneal sac. The foramen of Winslow may then become sealed off and form a cyst. The cyst may or may not contain ferments. Tissue digestion takes place only if the ferments are present and are activated by escaping bile or duodenal secretions.[1c] The absence of ferments does not necessarily imply that the cyst is of other than pancreatic origin.

ANATOMIC CONSIDERATIONS

The pancreas is a retroperitoneal gland lying transversely in the epigastrium and left hypochondrium. The head of the pancreas lies in the concavity of the duodenum. The body rests on the first or second lumbar vertebra with the aorta, the superior mesenteric artery, the left renal vein, the crura of the diaphragm, the left adrenal gland and the left kidney interposed between it and the posterior abdominal wall. The tail terminates above the left kidney and at the basal surface of the spleen. The head of the pancreas is attached anteriorly by areolar tissue to the transverse colon. The remainder of the anterior surface of the pancreas, from neck to tail, forms a considerable portion of the stomach bed. It is separated from the stomach by the lesser peritoneal sac, the posterior wall of which forms the peritoneal covering of the anterior surface of the pancreas. The inferior surface of the pancreas derives its peritoneal covering from the posterior layer of the transverse mescolon.

Owing to the anatomic position of the pancreas against the posterior abdominal wall, cysts can only extend forward and toward the line of least resistance. Theoretically the cyst could avail itself of almost any position in the abdominal cavity or pelvis. Adams and Nishijima[1a] found the cysts located between the stomach and liver; posterior to stomach and pressing against the gastrohepatic omentum; along the lesser curvature of the duodenum in the head of the pancreas; along the lesser curvature of the stomach, and in the root of the mesocolon. Berkay[8] listed the three most common locations in the order of their frequency as follows:

1. Behind the gastrocolic ligament and presenting between the stomach and the colon.
2. Under the gastrohepatic omentum and presenting between the stomach and the liver.
3. Between the layers of the transverse mesocolon, either behind the colon or below it.

The location of the cyst is very important and plays the deciding role in the choice of internal drainage.

DIAGNOSIS

The incidence of pancreatic cysts is about equal for the two sexes, and the majority of patients are in the middle-aged group.[1a] This sex balance has been explained by suggesting that women are more often prone to disease of the gallbladder and men are more frequently subject to trauma.

A pancreatic cyst may be of short or long

duration, depending on the cause. The symptoms are varied and are probably related to the degree of inflammation, the rate of growth and the amount of pressure on neighboring organs. The most common symptom is deep-seated pain in the epigastrium or right hypochondrium. The pain may be referred to the back. There may be nausea, vomiting and a feeling of fullness in the upper part of the abdomen, most marked after meals. Leukocytosis and fever depend chiefly on the degree of inflammation or infection present. Pinkham[1b] reported a comparatively high incidence of infection. Jaundice, glycosuria and "pancreatic stools" are rare. An abdominal mass is usually present, and this may be the only sign.

Diagnosis at times is elusive. A careful history should be taken. An attempt to determine the onset and course of the tumor is made. Any evidence of trauma, excessive alcoholic intake or previous disease of the gallbladder or the pancreas is noted. Beloff,[9] however, considers a previous gallbladder or pancreatic history of not too great importance diagnostically.

A thorough physical examination is done. In women, this should include a bimanual examination to exclude pelvic tumors. Some other conditions to be considered are: cysts of the liver, omentum and mesentery; hydrops and tumors of the gallbladder; gumma of the liver; retroperitoneal tumors and Hodgkin's disease; tumors of the stomach and spleen; kidney cysts and abscesses; aneurysm of the abdominal aorta, and the subphrenic abscess, which may fill the lesser sac and present an epigastric tumor.

A smooth tumor above the umbilicus in the midline or in the left hypochondrium is always suggestive of a pancreatic cyst. The tumor may be tense or slightly fluctuant. It may be movable, but it rarely moves with respiration. Attempts to needle or trocar a cyst through the anterior abdominal wall or retroperitoneally are dangerous and to be discouraged.

Probably the most valuable diagnostic aids are the upper gastrointestinal series, the barium enema and the I-V pyelogram. Such studies will show either gastrointestinal or renal disease or will reveal the presence of an extrinsic mass. Laparotomy is the final diagnostic test.

Fig. 1.—Cyst in region of tail of pancreas (AP view).

CLASSIFICATION

Pancreatic cysts have been variously classified by different authors.[15] Grandclaude and his associates[16] stated that a macroscopic classification is of little value and presented a microscopic classification. Mahorner and Mattson[1d] gave an excellent pathogenetic classification as follows:

A. Cysts resulting from defective development
   1. Cysts in infants
   2. Polycystic disease
   3. Lindau's disease
   4. Dermoid cysts
   5. Inclusion cysts
B. Pseudocysts
   1. Traumatic
   2. Inflammatory
C. Retention cysts
   1. Calculi
   2. Annular scar formation
D. Neoplastic cysts
   1. Cystadenoma
   2. Cystadenocarcinoma
   3. Teratomatous
E. Cysts caused by parasites

We feel that, for the surgeon, a simple, working classification should be devised which provides criteria indicating the proper sur-

gical procedure to follow. We suggest the following classification:

A. Benign cysts
   1. Pseudocysts (most common)
   2. Retention cysts (rare)
   3. Congenital cysts (rare)
   4. Parasitic cysts (very rare)

B. Neoplastic cysts (all very rare)
   1. Cystadenoma
   2. Cystadenocarcinoma
   3. Teratoma

TREATMENT

The treatment of pancreatic cysts offers three alternatives: (*1*) excision, (*2*) marsupialization and (*3*) internal drainage (cystovisceral anastomosis).

1. *Excision.*—In reviewing the literature, it was interesting to note that excision is almost invariably referred to as the "ideal treatment" for all types of cysts. This statement is usually coupled with a qualification, "not always feasible," "extremely difficult," "high mortality" and "danger to surrounding structures." It seems, then, that the "ideal treatment" is far from ideal.

Fig. 2.—Anterior displacement of stomach by pancreatic cyst (lateral view).

Excision may be extremely difficult and hazardous owing to the size or the location of the cyst, inflammatory processes and adhesions, and may necessitate removal of the tail and body of the pancreas. Such a procedure may result in diabetes and damage to nearby structures such as the common bile duct, the inferior and superior mesenteric arteries, the splenic vessels, etc. Carter and Slattery[11] reported 2 cases of damage to the common bile duct in a series of 5 cases.

The mortality is formidable. Lahey[12] reported 9 to 25 per cent mortality if excision is successful and up to 55 per cent if excision is unsuccessful. This falls in the category of the "cure being worse than the disease"! In our opinion a procedure with such a high mortality is certainly not justified for benign cysts.

It is time that the idea of excision as the "ideal treatment" for pancreatic cysts be reevaluated and its proper application determined. Excision or partial pancreatectomy should be used only on those cases which are grossly or by frozen section suggestive of malignancy. The only exception is the rare pedunculated cyst which can be excised with relative ease.

2. *Marsupialization.*—Marsupialization or external drainage is not completely satisfactory. This procedure may result in a draining fistula which will take weeks to years to heal. This is particularly true in the epithelially-lined cysts. The draining fistula may result in skin erosion, infection, disturbed electrolyte balance and nutrition and general debilitation.

Attempts have been made to obliterate fistulas by various caustics, roentgen rays, radium, dietetic regimes, prayer, etc. The number and diversity of the methods used are mute testimony to the lesions' resistance to healing. In desperation, in some cases, attempts are made to dissect the fistulous tract and anastomose it to the intestinal tract. It would be more logical to perform a cystovisceral anastomosis in the first place!

The present-day use of marsupialization is justified only when circumstances offer no alternative.

3. *Internal drainage (cystovisceral anastomosis.)*—We believe that internal drainage is the method of choice for all benign cysts. Internal drainage was first reported by Jedlicka[13] in 1923. In 1929, Jurasz[14] used a transgastric approach and Kirschner[15] a transduodenal approach. Although these and subsequent reports from abroad have been favorable, internal drainage in the United States has not reached the acceptance or popularity of marsupialization or excision.

It is the false conception of many that the anastomosed cyst forms an outpocketing of the intestinal tract which is in danger of contamination by food, bile and duodenal and gastric secretions. It is assumed that such accumulations could then lead to infection, necrosis, hemorrhage or acute pancreatitis. Kunc[16] stated that this fear is more theoretical than practical. He noted no major disturbances when the cyst was opened into the stomach or the duodenum. He stated that no reflux has been proved roentgenologically, nor has there been any evidence of infection or inflammation. Kunc advised a primary anastomosis with the stomach or the duodenum as the operation of choice. Other authors prefer a cystojejunostomy with a jejunojejunostomy to avoid contamination of the cyst.[17]

Pessagno and Shafer[18] have found the results of internal drainage good and do not fear the action of digestive juices on the pancreatic floor. They do not regard the procedure as curative, however, since there is no provision for obliteration of the cavity. This is not a valid criticism. The pseudocyst, when drained, immediately collapses and, owing to the nature of its lining, soon obliterates itself.[19] The epithelium-lined cyst also collapses, but it may continue to secrete. If drained internally, it provides no disturbance and can be likened to an accessory pancreatic duct.

The type of internal drainage chosen depends on the location of the cyst. After a study of the anatomic relations of pancreatic cysts, it is seen in the majority of cases that, somewhere in their course of presentation they are in intimate relation with the posterior wall of the stomach. Also, owing to the inflammatory processes usually present, the cysts are adherent to the posterior wall of the stomach in the lesser sac. This fact obviates the need for a cystogastric suture line except for hemostatic purposes.

Fig. 3.—AP view three months after operation. Stomach within normal limits.

We are therefore, of the opinion that the operation of choice in the majority of cases is a transgastric pancreatocystogastrostomy. This complicated name represents a simple, satisfactory and safe operation. For those few cysts which are not in intimate relation to the stomach (those presenting in the transverse mesocolon or below it), cystoduodenostomy or cystojejunostomy becomes the method of choice. These procedures, however, are accompanied by greater risk, owing to technical difficulties in performing such anastomoses and because these anastomoses lie free in the greater peritoneal cavity.

TECHNIC OF TRANSGASTRIC PANCREATOCYSTOGASTROSTOMY

Under suitable anesthesia, the abdomen is opened. The abdominal cavity is explored. If the transgastric approach is indicated, as is usually the case, guy sutures are placed in the midportion of the anterior wall of the stomach. A transverse incision is made, and the guy sutures are used as retractors. Owing to the anterior displacement of

Fig. 4.—Lateral view three months after operation. Stomach within normal limits.

the stomach by the cyst, the posterior wall of the stomach presents itself in the opening. The cyst is palpated through the gastrostomy wound, and the site for the second opening is selected. Four guy sutures are placed through and through the posterior wall of the stomach and the adherent cyst. A large trocar is thrust through this area, and the cyst is aspirated. (This material may be saved for cell study.)

The trocar is withdrawn and, with tension on the guy sutures, the opening is enlarged to about 4 cm. A palpating index finger is now inserted and the wall of the cyst cavity carefully explored. A biopsy specimen, if advisable, may be obtained at this time. (If the rare malignant cyst is diagnosed, the feasibility of radical excision is considered. If the risk is deemed too great or the lesion considered inoperable, internal drainage, as stated, becomes the palliative procedure of choice.) If benignity is assured, the cystogastrostomy opening is ringed with interrupted gastrointestinal sutures to insure hemostasis. The possible purse-stringing effect of the continuous suture is avoided. Next, the anterior gastrostomy wound is closed, and the laparotomy is carried on to completion. No special postoperative care is needed other than Wangensteen suction for a day or so.

REPORT OF A CASE

A 36-year-old white man was seen July 23, 1947, complaining of sharp pains in the right upper abdominal quadrant of three days' duration and slight jaundice. A gallbladder series revealed a poorly functioning gallbladder but no calculi. A cholecystectomy was done. The patient made a good recovery.

He did fairly well for the next three and one-half months, after which (on November 13) severe epigastric cramping pains and distention developed. The pain was worse in the right upper quadrant of the abdomen and radiated to his back. He was hospitalized. A serum amylase test the next day resulted in a value of 120 mg. per hundred cubic centimeters and rose to 161 mg. in the next twenty-four hours. A flat plate of the abdomen revealed no abnormalities. A diagnosis of acute pancreatitis was made. Laparotomy, performed on November 15, revealed a lesser peritoneal sac filled with serosanguinous fluid and an enlarged, tense pancreas. There was some fat necrosis in the mesocolon. The common bile duct was free of stones.

The lesser sac was drained through the foramen of Winslow and through the gastrocolic ligament. The patient was discharged on November 27, after a difficult postoperative course.

He was readmitted on December 25 with a complaint of constant epigastric pain, anorexia and loss of weight since his previous discharge. In the past twenty-four hours the pain had become so severe that he was able to retain only fluids. He complained of distention in the upper part of the abdomen.

Physical examination revealed the patient to be thin and chronically ill. He had a visible, palpable, smooth, tense epigastric mass, particularly tender on the right.

Laboratory tests revealed an essentially normal blood count. The urine gave a 3 plus reaction for albumin. It contained granular and hyaline casts,

Gastrointestinal roentgenograms taken on December 26 showed a mass in the region of the tail of the pancreas, possibly a cyst. There was partial obstruction of the third portion of the duodenum, possibly secondary to a surrounding inflammatory process, perhaps in the pancreas.

Operation was done on Jan. 9, 1948. A large pseudocyst of the pancreas was observed, occupying the lesser sac and displacing the stomach. Transgastric pancreatocystogastrostomy was done according to the technic previously described.

The postoperative course was smooth and without incident. A follow-up gastrointestinal series on January 22 showed almost complete disappear-

ance of the evidence of a soft tissue mass in the tail of the pancreas. A fistula of the posterior wall of the stomach was seen, but there was no evidence of barium in the cyst. A small amount of air was present in the cyst. The deformity of the duodenum was no longer evident. Another gastrointestinal series (April 5) showed the upper gastrointestinal tract to be within normal limits. There was only slight fixation of the stomach in the region of the previously existing stoma. The soft tissue mass near the tail of the pancreas had completely disappeared. There was no evidence of barium or air in the region of the pancreas.

The patient has remained well to date.

SUMMARY AND CONCLUSIONS

1. Pancreatic cysts are discussed and the literature reviewed.

2. A simple, working classification of pancreatic cysts for the surgeon is presented, which provides criteria indicating the proper surgical procedure to follow.

3. The different surgical procedures are discussed and reevaluated. Transgastric pancreatocystogastrostomy is stressed as the surgical procedure of choice for all benign cysts in the retrogastric position. Excision or partial pancreatectomy should be reserved for neoplastic cysts. Marsupialization is justifiable only when there is no other alternative.

4. The technic of transgastric pancreatocystogastrostomy is described.

5. A case in point is presented, in which this treatment was successfully employed.

Although used on a few occasions abroad,[20] this method of internal drainage has not been sufficiently stressed in the United States. A search of the literature for the past three decades reveals only 1 case of its use by an American surgeon, and that inadvertently.[21] Conclusions from this study indicate that the transgastric technic becomes the method of choice for the vast majority of benign cysts of the pancreas.

RÉSUMÉ

1. La discussion porte sur les kystes pancréatiques, et on passe en revue des articles parus à ce sujet.

2. On présente une simple classification des procédés employés, pour les kystes pancréatiques, par le chirurgien, qui fournit des crytères indiquant le procédé chirurgical approprié qu'il convient de suivre.

3. Les différents procédés chirurgicaux sont discutés et réconsidérés. La pancréatocystogastrostomie transgastrique est indiquée comme étant vraîment le procédé de choix pour tous les kystes bénins dans la position rétrogastrique. L'excision ou la pancréatectomie partielle doit être réservée pour le kyste néoplasique. On ne peut guère justifier la marsupialisation que lorsqu'il n'y a pas moyen de faire autrement.

4. On décrit la technique de la pancréatocystogastrostomie.

5. On rapporte un cas typique dans lequel ces traitements furent employés avec succès.

Quoi qu'elle soit employée à l'étranger dans quelques cas,[20] cette méthode de drainage interne n'a pas été suffisamment mise en relief dans les Etats Unis. En recherchant dans la litérature, durant les trois décades passées, on trouve seulement un cas où elle a été employée par un chirurgien américain, et encore, tout à fait par hasard.[21] Les conclusions de ces études montrent que la technique transgastrique est la méthode de choix pour la grande majorité des kystes bénins du pancréas.

RESUMEN Y CONCLUSIONES

1. Se estudian los quistes pancreáticos, pasando revista a la literatura médica sobre los mismos.

2. Proponen los autores una clasificación sencilla y práctica para el cirujano de los quistes pancreáticos que le permite decidir la técnica quirúrgica a adoptar.

3. Se analizan y evaluan los diferentes métodos quirúrgicos, pero el procedimiento preferible para todos los quistes benignos en posición retrogástrica es la pancreatocistogastrostomía transgástrica, debiendo reservarse la extirpación o pancreatectomía parcial para los quistes neoplásicos. Solamente está justificada la marsupialización cuando no existe otra alternativa.

4. Se describe la técnica de la pancreatocistogastrostomía transgástrica.

5. Se describe un caso en el que se aplica satisfactoriamente este tratamiento.

Aunque se ha usado en el extranjero en algunos pocos casos, este método del drenaje interno no se ha dado a conocer suficientemente

en los Estados Unidos. Una investigación de la literatura durante los últimos treinta años ha revelado un caso en el que se empleó por un cirujano norteamericano, aunque ello fué de un modo casual.

Las conclusiones a canzadas en este trabajo indican que la técnica transgástrica es el método preferible en la inmensa mayoría de los quistes benignos del páncreas.

RIASSUNTO

1. Passano in rassegna e descutono la letteratura sopra le cisti pancreatiche;

2. Presentano una classificazione molto semplice, ma pratica per il chirurgo, che provvede i criteri per la scelta di un determinato metodo operatorio:

3. Ricordano i diversi metodi operatori. Ritengono che la pancreatocistogastrostomia transgastrica sia il metodo di elezione per le cisti benigne dello spazio retrogastrica. L'escisione o la pancreatectomia parziale dovrebbero essere riservate alle cisti neoplastiche. La marsupializzazione e' giustificabile solo allorquando non esistano altre possibilita':

4. Descrivono la tecnica della pancreatocistogastrostomia:

5. Riportano un caso così operato, con completo successo.

Benche' nella letteratura straniera figurino molti casi così operati, negli S.U. risulta un solo caso negli ultimi 30 anni. Giungono alla conclusione che la tecnica transgastrica e' quella che deve essere prescelta nella maggioranza dei casi di cisti benigne del pancreas.

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Rhinoplasty:

Its Surgical Complications and How to Avoid Them

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ALL who are conversant with rhinoplastic surgery are well aware that at times, even in the most capable hands, the results leave much to be desired. I shall endeavor in this paper to point out some of the more common pitfalls and suggest how they can be avoided and, once they have occurred, how they can be corrected. Every phase of the operation entails particular hazards, and these will be taken up serially.

Preoperative Investigation: One must guard against operating upon a patient who may be incipiently schizophrenic. A slight deformity magnified out of proportion or a delusion creating an imaginary deformity calls for a psychiatric consultation. Rhinoplasty in such cases will not effect a change in personality. There are patients, however, who in spite of a depressive or neurotic state may, on the advice of the psychiatrist, be operated upon with great benefit to their morale and stability. The psychiatrist will decide, after he takes inventory of the patients, which of them should be selected for operative treatment, elminating those with possible psychoses. Postoperative psychotherapy may serve as a valuable adjunct in certain cases.

In addition to the obvious preoperative information that has to be obtained, several observations should be made. The texture of the skin should be noted. If the skin is of the rhinophymatous type, undue thickening may result postoperatively from hypertrophy and hyperplasia of the sebaceous glands. Large-pored skin filled with sebaceous matter is inelastic and will not readily drape itself to the remodeled nose, especially about the tip. Prognosis should be guarded, and limitations should be pointed out to the prospective patient with nasal skin of this kind. Roentgen therapy instituted one week after the rhinoplasty may have a favorable influence. Previous roentgen therapy as a rule does not contraindicate the operation.

An oily skin also detracts from the success of the operation, as it does not heal well. The quality of the cartilages of the tip should be ascertained by inspection and palpation. Thin, flaccid cartilages militate against good remodeling, whereas firm cartilages not only facilitate the shaping of the tip but aid in its maintenance. In my opinion the presence of chronic sinusitis offers no contraindication to the operation. Apparently there is local immunity to organisms that have long been harbored in the sinuses. Thorough nasal cleansing before the operation, supplemented by prophylactic chemotherapy, will provide adequate preparation. After acute infections of the upper part of the respiratory tract an interval of at least two weeks should elapse before rhinoplasty is performed.

The preoperative workup should include study of the patient by means of photographs and casts. These can be charted like a blueprint, so that the desired esthetic angles and curves are readily and accurately obtained. Such analysis not only assists in diagnosis and management of the deformity but contributes to the development of esthetic appreciation. It must be emphasized that diagnosis is of great importance toward the success of the operation.

OPERATIVE COMPLICATIONS

1. *Complications Associated with Anesthesia:* The method of anesthetization and sedation contributes much to the smoothness of the operation. I use monocaine 1.5 per cent and epinephrine 1:30,000 (Novocol). Block anesthesia with monocaine and epinephrine is preferable to infiltration, as it will produce less edema with less masking of the deformity

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Fig. 1.—Two cases of faulty hump removal. *Left*, bony saddle due to excessive removal of bone and insufficient removal of cartilage. *Right*, convex upper cartilaginous vault in addition to faulty hump removal; excessive projection of inadequately remodeled lip.

during the operation and will minimize swelling and ecchymosis after the operation. Adequate preoperative and supplemental sedation during the operation will do much to keep the most apprehensive patient quiet.

2. *Complications in Uncovering the Nasal Pyramid:* Tiny bumps on the dorsum, areas of pallor, redness or cyanosis, and hypersensitivity to climatic changes may result from an irregular elevation of the subcutaneous tissue and periosteum over the nasal pyramid. This occurs when the plane of separation is made in the muscle layer instead of just above the perichondrium over the cartilaginous portion of the dorsum, and beneath the periosteum of the osseous vault. The periosteum should be elevated as a smooth and even layer, and bare bone should be felt as the elevation takes place. Otherwise the operative site becomes frayed and periosteal thickening may develop.

3. *Complications in Removal of the Osseous Hump:* A bony saddle or an undue prominence near the nasofrontal angle may result from improper removal of the bony hump. Study of the analyzed photograph and cast will help to determine the precise amount of hump to be removed. A bony saddle will result if the saw cuts too low. This can be corrected by reinsertion of part of the hump at the time of operation. Unless this is done, subsequent insertion of an implant will become necessary. Cartilage transplants may also be used but are subject to distortion and absorption. An undue prominence will result at the nasofrontal angle if the upper solid area is not included in the hump removal. In such a contingency the nasal bones can be leveled by judicious use of the heavy scissors, chisel, rasp or biting forceps. Obliteration of the frontonasal angle can be caused by too vigorous use of the rasp. Edema

is manifested early. The traumatic periostitis is soon followed by osteogenic proliferation, which eliminates the graceful angle between the nose and the forehead.

The bony hump should be removed at an even level unless the nose presents a bony twist. Under these circumstances, to prevent asymmetry the saw is placed obliquely instead of horizontally as it cuts through the hump, removing more from the broad concave than from the narrow convex side of the deviation. The two bones are thus equalized in size, so that after fracture and shifting of the frontal processes of the maxillae the bones meet in the midline.

One not infrequently encounters an unduly wide nasal bridge associated with irregularity of the dorsum. This sequela arises from improper use of the chisel in breaking the spring of the solid block of bone at the nasofrontal angle prior to the mesial shifting of the nasal pyramid. It can be avoided by engaging the chisel close to and parallel with the septum and advancing the instrument in this plane to the nasofrontal articulation. If the instrument slips out of the plane and cuts obliquely through the body of the nasal bones, shifting of the pyramid must take place below the chisel cut, leaving the root of the nose immobile and broad and the mobile segment depressed.

A wide bridge will often result from outfracturing of the frontal processes, as the bones may be dislocated in the maneuver. Upon mesial displacement after osteotomy, some soft tissue caught between the outfractured bones causes them to assume an abnormally wide position. This may be avoided by placing the chisel below the level of the nasal bones during this maneuver. Occasionally, in old unreduced fractures with overlapping, the outfracture may become necessary before the nasal bones can be mobilized. It is important in making the outward fracture that the chisel be aligned along the entire free margin of the bone and that the pressure exerted be uniform to avoid comminution of the caudal part of the nasal pyramid where the bones are weakest.

At times a dorsal projection of the septum may become apparent after removal of the hump and mobilization of the nasal pyramid, and with the subsidence of edema the sharp edge of the septum will project as a thin vertical ridge between the nasal bones. This can be avoided at the time of operation by rasping down the projecting portion. Unless this is done a small secondary operation will be necessary for removal of the projection.

4. *Complications in Reduction of the Cartilaginous Part of the Dorsum and the Upper Lateral Cartilages:* Depressions, irregularities and undue rounding of the middle cartilaginous vault may follow an improper removal of the cartilaginous portion of the dorsum. After the bony hump has been sawed through, the button knife is inserted beneath it and sectioning is continued in the same plane downward to the end of the septum. Tilting of the knife will produce a break with elevations or depressions along the profile line. It is equally important that the upper lateral cartilages be trimmed to the new height and length of the septum; otherwise their extensions over the midline will fill in with granulation tissue and cause the formation of an undesirable lower dorsal convexity. A roundness in this area may also be brought about by undue thickness of the overlying skin. In such cases the cartilaginous portion of the dorsum should be made to incline slightly lower than the newly

Fig. 2.—Anterior view. Note depressed right lateral nasal wall due to faulty osteotomy; fracture occurs below nasofrontal articulation because of failure to break spring of solid block of bone at root of nose.

Fig. 3.—*Left*, depression on left of bridge due to absence of left nasal bone, removal at rhinoplasty (confirmed by roentgenogram). *Right*, result of correction by filling in defect with cartilage.

formed profile line, in order to accommodate and compensate for such thickening. Should this occur, a secondary operation becomes necessary for removal of more septum and of the redundant scar tissue that fills the subcutaneous space.

Irregularities of the dorsum may also be due to incompletely removed cartilaginous fragments. To avoid this sequela, frequent inspection and cleansing is necessary when it is suspected that fragments have been left in the dorsal space. A unilateral or bilateral pinched-in appearance of the nose may result from an indiscreet removal of the upper lateral cartilages. Occasionally the subsequent cicatrization between the septum and the remains of the cartilage produces synechiae and interferes with nasal respiration.

A deformed nose associated with a deviated septum introduces additional problems in rhinoplasty, and unless the septum is given consideration even the most technically executed rhinoplasty may fail to give the desired result. Deviations of long standing, especially those dating back to childhood, in addition to buckling or dislocations of the septum, are frequently associated with fibrotic, thickened, atrophied, or adherent lateral cartilages. To restore these structures to normal contour is often a difficult matter. The septum must be treated simultaneously with the rhinoplasty if its distortion lies in front of an imaginary line running from the nasal spine of the frontal bone to the nasal spine of the maxilla; if behind this line, it can be resected before, during or after the rhinoplasty. It is my practice in most cases to perform the two procedures at the same sitting, the submucous resection and the rhinoplasty. Enough of the dorsal cartilage is then left so that it can be trimmed down to the amount necessary for support of the bridge after the hump has been removed.

For marked deviations of the cartilaginous portion of the dorsum accompanied by extreme

deviation of the septum, I sometimes remove the entire septum and reinsert the material in the form of a graft. This not only corrects the deflection and elevates the dorsum but materially improves nasal physiologic function. The management of the reconstructed septum requires good surgical technic and judgment. Should stability of the nose become apparent, the immediate dorsal and columellar implantation of cartilage is advised.

5. *Complications of Osteotomy:* A broad flat dorsum, a simulated deviation or a steplike depression or ridge may result from an improperly performed osteotomy. If, after the hump has been removed, the flat triangular gap remaining between the nasal bones is not obliterated by a mesial displacement of the frontal processes of the maxillae, it fills in with fibrous tissue, which becomes calcified and results in a broad, flat, unsightly dorsum. In the performance of the osteotomy great care should be taken to avoid a greenstick fracture of the frontal processes, with their tendency to spring back to their original positions. This deformity can be overcome only by breaking the spring of the nasal arch and shifting the walls medially.

A simulated deviation of the nose may result from the approximation of asymmetric fragments after an osteotomy performed at unequal levels. A steplike ridge along the line of osteotomy may result from a depression of the completely fractured segment. Should this occur, the depressed fragment must be elevated and held in the proper position by packing until it becomes fixed. The occurrence of a ridge may also result from osteotomy performed at a too anterior level. Irregular lateral ridges may be the result of comminuted fractures arising from improperly applied digital pressure. A proper osteotomy and properly applied digital pressure will also do much to minimize postoperative edema and ecchymosis. An audible, unmistakable click, an easily movable nasal pyramid and an even obliteration of the dorsal gap indicate a satisfactory osteotomy.

6. *Complications in Shortening:* One of the most common errors arising from improper shortening is a retracted columella. This is due to an excessive removal of the membranous septum and can be avoided by making the transfixion close to the caudal margin of the septum. A retracted base results from excessive removal of septal cartilage, the mesial crura being drawn in when they are reattached to the shortened septum. Correction is best accomplished by a columellar implant.

Another common error is failure to reduce properly the hanging septum, which is caused rather by excessive width of the mesial crura than by lengthening of the septal cartilage.

Fig. 4.—*Left,* twisted hump corrected by hump removal and rhinoplasty. *Center,* sharp edge of perpendicular plate of ethmoid, which appeared as tiny spicule three months after operation. *Right,* smooth dorsum resulting from removal of thin sliver of cartilage.

Fig. 5.—Lateral views of low cartilaginous hump and result following adequate trimming of septum and upper lateral cartilages.

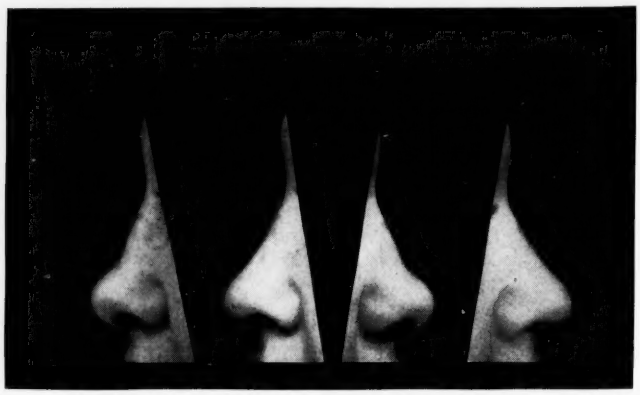

Fig. 6.—Cartilaginous saddle due to excessive removal of anterior inferior end of septum, corrected by septal cartilage implant.

Here, in spite of proper shortening of the septal cartilage, the projection of the mesial crura gives the impression of elongation. To eliminate this error, the septum and mesial crura must be independently reduced.

7. *Complications in Modeling of the Lobule:* The unfortunate oddities resulting from flaws in diagnosis and technic occur most frequently in this conspicuous region. Uneven, irregular, displaced, angulated, pinched-in, scarred or collapsed nostrils are sequelae not infrequently seen. It is essential in the majority of instances to reshape the tip and alae to harmonize with the newly formed nose. Unless this is done, the nose has an unnatural disproportionate appearance. Diagnosis of the great variety of malformations of the lobule before surgical intervention is important. Some of the problems encountered are simple and common, others difficult and unusual: e.g., simple reduction in size, lengthening of a short columella at the expense of the lip, introduction of a strut where the cartilaginous support is missing, correction of an improper alar flare, readjust-

Fig. 7.—*Left*, result of faulty rhinoplasty. Note persisting dorsal convexity. *Right*, result following adequate trimming of septum, upper and lower lateral cartilages and columella.

ment of the dislocated lower lateral cartilages into normal position and swinging in of atrophied lower lateral cartilages.

In operating on the tip, great care must be taken in delivery of the cartilages if function is to be preserved. The undermining must be in the subperichondrial plane, separating the alar cartilages from the subcutaneous tissue without fraying the overlying thin muscle layer. Improper separation may lead to pitting or ridges and result in an artificial, expressionless nose. Cartilaginous segments of equal shape and size should be excised from both sides for a symmetric reduction. Removal of too much cartilage may cause alar collapse. A sacrifice of vestibular skin, with the inevitable cicatrization that results, will lead to distortion, stenosis or even atresia of the nostrils. This can be corrected only by skin grafting and the insertion of cartilaginous implants. Fragmentary removal of cartilages causes pinched-in depresions. These may be filled out by implantation of bits of cartilage. Puncturing of the skin and accidental cuts at the margins of the nostril must be carefully guarded against, as retracted scars follow that are difficult to correct.

POSTOPERATIVE COMPLICATIONS

The incidence of complications arising from rhinoplastic procedures is very small. Many surgeons have performed hundreds of operations without sequelae. This is doubtless due to careful planning, application of an atraumatic technic and the prophylactic use of antibiotics.

1. *Infection:* Postoperative acute infections of the upper respiratory tract or acute sinusitis respond to conservative treatment with or without chemotherapy, and their influence on the rhinoplasty is as a rule minimal except for a temporary increase in edema. Even the presence of frank pus in the nasal chambers seldom alters the good prognosis. I have seen patients

Fig. 8.—Anterior views showing twisted tip (accompanied by nasal obstruction) due to injury in childhood, corrected by simultaneous submucous resection and rhinoplasty.

Fig. 9.—Lateral views showing small hump and cartilaginous depression, with correction.

in whom grafts have implanted undergo acute suppurative intranasal infections without any untoward effects.

Rhinoplastic infections have to be watched carefully. Localization should be awaited, as resolution often takes place spontaneously. Should suppuration occur, dependent drainage can be obtained through endonasal incisions. Those infections that occur at the uppermost parts of the nose are easily approached by small incisions that heal without leaving telltale marks. Judgment and deliberation must be exercised before removing grafts that lie in infected areas. Frequently, after drainage, the infection subsides without altering the graft.

2. *Complications Due to Pressure:* Occasionally necrosis of the skin or scarring around the tip and along the outer margins of the frontal processes is encountered. Excessive or improper pressure of the skin by splints or adhesive tape is the usual cause. Although these appliances are essential to keep the newly shaped parts in proper position to prevent edema and hematoma formation, an excess of pressure can shut off the blood supply and lead to tissue destruction. Should inspection of the skin twenty-four to forty-eight hours after operation disclose ischemia or cyanosis, all pressure must be removed.

3. *Complications Associated with Sutures:* Localized infections about the base of the nose appearing twelve to fourteen days after rhinoplasty are usually due to inadvertently retained parts of sutures. I recently saw a patient who had had several operations for infections around the tip of the nose following a rhinoplasty. The infection persisted, and examination revealed a fistula draining from the mesial crus. I extracted the knot of a black silk suture, which had remained buried in the tissue between the upper ends of the mesial crura. The patient recovered rapidly. An abscess of the septum following rhinoplasty in which a black silk suture was found was also brought to my attention. A long thread left behind the knot is safer than a suture cut short, as the supervening edema may conceal the suture and make it difficult to grasp when it has to be removed.

Fig. 10.—Cast showing (*left*) saddle nose deformity following simultaneous rhinoplasty and septal reconstruction and (*right*) result of correction by nasal implant.

SUMMARY

A review of the common complications that may be encountered in performing a rhinoplasty is presented. The complications are taken up serially. Consideration is given to each step of the operation, and suggestions are offered as to how to avoid and correct errors in technic. Preoperative planning not only assists in the diagnosis of the nasal deformity but contributes to the esthetic result desired.

The physiologic structure and function of the nose must be constantly kept in mind. Sacrifice of vestibular skin with subsequent cicatrization leads to distortion and interference with nasal respiration. Excessive removal of cartilage will cause alar distortion and nasal obstruction. The removal of the hump must be done precisely; if the hump is inadequately

Fig. 11.—*Left,* anterior view showing wide dorsum due to faulty osteotomy and failure to shift lateral walls mesially. *Right,* lateral view showing minor saddle due to excessive hump removal.

removed, not only does the excessive use of the rasp invite infection but the resultant periostitis produces irregularity of the dorsum and may obliterate the desirable angle between the nose and the forehead. Excessive hump removal produces a bony saddle; immediate correction is necessary. Improper use of the chisel in breaking the nasofrontal articulation or outfracturing of the frontal processes will produce a wide nasal bridge. Irregularities of the dorsum are also caused by an uneven elevation of the skin and periosteum over the nasal pyramid when the proper plane is not entered; incompletely removed fragments of cartilage and debris also contribute. Upper lateral cartilages must be removed so that they do not overlap the septum; on the other hand, excessive removal will result in cicatrization of the septum and cartilage with production of a pinched-in nose as well as interference with nasal breathing. Frequently a plastic operation

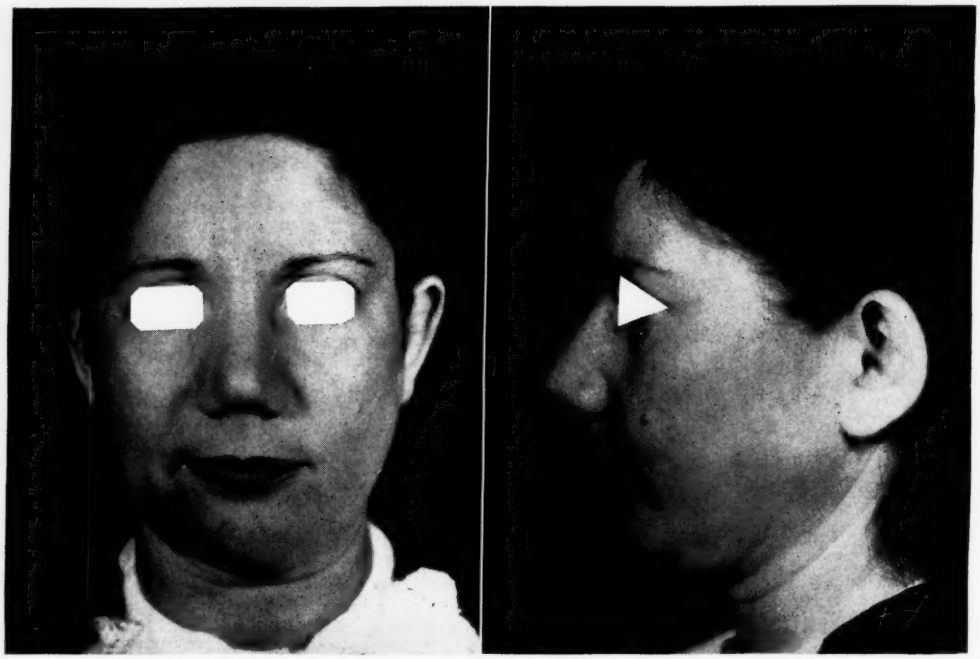

Fig. 12.—Retracted columella caused by excessive removal of septum in combined submucous resection and shortening of nose. This was corrected by insertion of a columella strut.

Fig. 13.—*Left,* anterior view showing (1) saddle of cartilaginous dorsum due to excessive removal of upper lateral cartilages and septum; collapse of alar walls due to faulty trimming of lower lateral cartilages, and tremendous retraction of columella. *Center,* profile views showing indentations on either side of lobule. *Right,* basal view showing asymmetry of nostrils. Intranasal examination showed narrowed vestibules, especially on left side, due to cicatrization between septum, mesial crura and remaining vestibular skin, most of which had been sacrificed.

Fig. 14.—*Left,* vestibular atresia due to excessive removal of lower lateral cartilages and cicatrization between septum, mesial crura and remaining vestibular skin, causing marked nasal obstruction. *Right,* result following removal of scar tissue and skin grafting of vestibule.

Fig. 15.—*Left,* anterior view showing broad dorsum due to hump removal without medial mobilization of lateral walls of nose; alar clefts due to excessive removal of lower lateral cartilages and vestibular skin, followed by adhesion causing stenosis of nares and interference with respiration; retracted columella. *Center,* right and left lateral views showing alar clefts and retracted columella. *Right,* basal view showing distortion of nares and pinched lobule.

Fig. 16.—*Left,* anterior view of broad dorsum due to hump removal without osteotomy; right alar collapse with vestibular atresia due to removal of skin and lower lateral cartilages; deviated dorsum caused by scar contracture. *Center,* lateral view showing persisting convexity and collapse of alar wall. *Right,* basal view showing asymmetric nostrils with alar clefts.

on the septum has to be performed in conjunction with the rhinoplasty. Complete removal of the septum and its reinsertion as a graft not only produces excellent cosmetic results but improves nasal obstruction. The management of the lobule is complicated by the diversity of problems encountered. The details are many; the complications arise chiefly from improper undermining and indiscriminate removal of vestibular skin and cartilage. Various deformities follow, which are corrected by skin grafts and cartilaginous transplants.

Postoperative complications are rare but should be handled conservatively. Prophylactic chemotherapy is especially indicated in cases of excessive tissue trauma and in tissue transplants.

RÉSUMÉ

On passe en revue les complications banales que l'on peut rencontrer au cours d'une rhinoplastie; elles sont exposées sérieusement. On examine chaque stade de l'opération et on fait des suggestions sur la façon d'éviter et de corriger des erreurs de technique. Les soins préopératoires non seulement aident à faire le diagnostic de la déformation nasale, mais contribuent également à obtenir le résultat esthétique cherché.

On doit constamment avoir à l'esprit la structure physiologique et le comportement fonctionnel du nez. L'enlèvement de la peau vestibulaire et la cicatrisation qui suit doit provoquer de la déformation et des troubles de la respiration nasale. L'ablation trop étendue des cartilages sera aussi la cause des déformations et obstructions nasales. L'ablation de la bosse doit être exécutée avec précision. Si la bosse est enlevée d'une façon insuffisante, non seulement l'emploi excessif de la râpe est une invite à l'infection, mais la périostite qui en résulte donne lieu à la production d'irrégular-

ités sur l'arête du nez et peut combler l'angle nécessaire à l'union du nez et du front. Une ablation excessive de la bosse a pour résultat une selle osseuse; il est nécessaire de la corriger. Un emploi intempestif du ciseau en endommageant l'articulation nasofrontale ou en fracturant les parties frontales, produira un large pont nasal. Les irrégularités de l'arête sont aussi produites par une élévation irrégulière de la peau et du périoste sur la pyramide nasale lorsque l'on ne pénètre pas dans l'espace adéquat. A cela aussi contribue une ablation incomplète des fragments du cartilage et de ses débris. Les cartilages latéraux qui sont au-dessus doivent être enlevés de telle façon qu'ils ne dépassent pas la cloison, autrement dit, une ablation excessive donnera comme résultat une cicatrisation de la cloison et du cartilage avec production d'une arête nasale étroite, ainsi que des troubles de la respiration nasale. Fréquemment une opération plastique de la cloison doit être accomplie en même temps que la rhinoplastie. L'ablation totale de la cloison et sa réinsertion comme greffe produit non seulement un excellent résultat esthétique mais améliore l'obstruction nasale. L'arrangement du lobule est compliquée par la diversité des problèmes rencontrés. Il y a beaucoup de détails et les complications surviennent surtout à la suite d'un soulèvement inadapté et de l'ablation inconsidérée de la peau vestibulaire et du cartilage. Des déformations variées suivent. On peut les corriger par des greffes cutanées et des transplants cartilagineux.

Les complications post-opératoires sont rares mais doivent être traitées dans un esprit conservateur. La chimiothérapie est particulièrement indiquée dans les cas où il y a eu un traumatisme excessif des tissus ainsi que dans les transplantations de tissu.

RESUMEN

El objeto de esta comunicación es presentar un estudio de las complicaciones más frecuentes que pueden hallarse al hacer una rinoplastia. Una vez estudiada paso a paso la intervención se dan una serie de sugestiones sobre cómo evitar y corregir los errores de técnica. El planeamiento preoperatorio de la intervención no solamente ayuda a diagnosticar la deformación nasal sino que ayuda a obtener el resultado estético deseable.

Debe recordarse continuamente la estructura fisiológica y la función de la nariz. El sacrificio de la piel del vestíbulo nasal con la

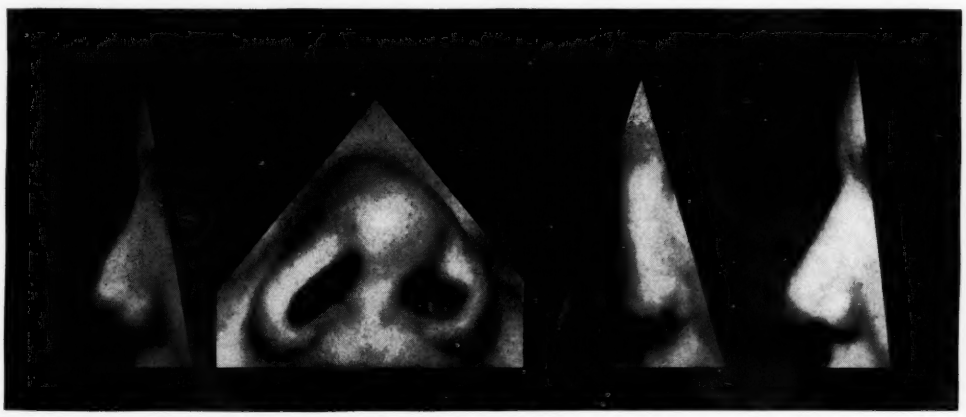

Fig. 17.—*Left,* lateral view showing simulated depression of tip caused by button and knife skirting anterior inferior end of septal cartilage; cleft ala due to trimming of lower margins of lower lateral cartilages with subsequent cicatrization. Absence of normal skeletal support causes skin to sink beneath surface. *Left center,* basal view showing cleft ala to better advantage; also retracted columella due either to excessive removal of septal cartilage or to undue sacrifice of membranous portion of septum. Oblique columella is caused by sacrifice of vestibular skin; subsequent contracture pulls tip to left side. *Right center,* anterior view of cleft. *Right,* lateral view showing correction.

cicatrización subsiguiente, conduce a una distorsión, e interfiere con la respiración nasal. La extirpación excesiva del cartílago conduciría a resultados similares. La extirpación de la deformación debe hacerse con exactitud, ya que de no hacerse así, no solamente puede determinar una infección si el raspado nasal es excesivo, si no que además, la periostitis resultante produce irregularidades en el dorso de la nariz y puede llegar a obliterar el ángulo externo entre la nariz y la frente. Si la extirpación fuera excesiva se produciría una nariz en silla de montar que requeriría otra intervención quirúrgica. El empleo inexperto del escoplo para romper la articulación nasofrontal, o la fractura de los procesos frontales producirá un puente nasal demasiado amplio. La elevación desigual de la piel y periostio sobre la pirámide nasal cuando no se aborda quirúrgicamente el plano adecuado, produce irregularidades del dorso nasal, a lo que contribuye también la extirpación incompleta de los fragmentos ósteo-cartilaginosos.

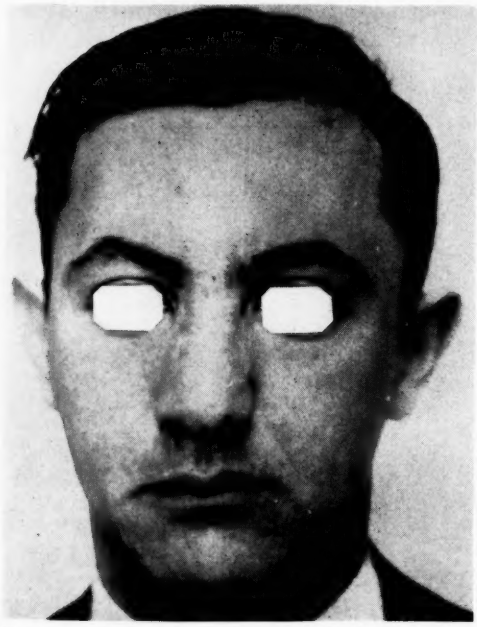

Fig. 18.—Lateral ridges on either side of nose, due to use of Joseph splint.

Deben extirparse los cartílagos laterales superiores para que no queden superpuestos sobre el tabique nasal. Por otra parte, si se extirpan en exceso determinan una cicatrización del tabique y del cartílago, produciendo una retracción nasal y dificultando la respiración. Con frecuencia junto con la rinoplastia resulta indispensable una operación plástica sobre el tabique. La extirpación total del tabique y su reinserción en un injerto, no solamente produce excelentes resultados cosméticos, sino que mejora a obstrucción nasal. Se estudian también los problemas de la operación sobre el lóbulo nasal. Ciertas complicaciones nacen de la eliminación inadecuada de la piel y cartílago vestibulares, pudiendo corregirse las dificultades consiguientes mediante injertos cutáneos y transplantaciones cartilaginosas. Las complicaciones postoperatorias son raras, pero deben cuidarse conservadoramente. La quimioterapia profiláctica está especialmente indicada en los casos de excesivo traumatismo tisular y en las transplantaciones de tejidos.

RIASSUNTO

Passa in rassegna le complicazioni piu' comuni che insorgono nell'esecuzione di una plastica nasale. Speciale considerazione viene data ad ogni fase dell'operazione, avanzando opportuni consigli onde evitare e correggere possibili errori di tecnica. Un esatto programma preoperatorio non solo aiuta nel formulare la diagnosi della deformità nasale, ma contribuisce al raggiungimento del risultato estetico desiderato.

Occorre avere sempre in mente la struttura fisiologica e la funzione del naso. Il sácrificio della cute vestibolare, con la successiva cicatrizzazione, conduce a distorsioni ed anomalie nella respirazione nasale. Un'eccessiva rimozione della cartilagine sara' causa di distorsioni e di ostruzione nasale. L'asportazione della gobba nasale deve essere eseguita con esattezza: se l'asportazione non e' sufficiente, la necessita' di un energico raschiamento aprirà non solo la strada ad un'infezione, ma la periostite che ne consegue condurra' ad irregolarita' del dorso del naso e ad una possibile obliterazione dell'angolo desiderato fra il naso e la fronte. Un'escisione troppo generosa della gobba condurra' per converso ad

una sella ossea, che rendera' necessario in'immediata correzione. L'uso non appropriato dello scalpello nel rompere l'articolazione neso-frontale o nel fratturare in eccesso i processi frontali produrra' un ponte nasale troppo largo.

Irregolarita' del dorso possono essere anche dovute ad un'elevazione non uniforme della cute e del periostio sopra la piramide nasale all'orquando un'appropriato piano di clivaggio non viene trovato o seguito: possono contribuire a queste irregolarita' anche frammenti cartilaginei.

Le cartilagini laterali superiori debbono essere rimosse, di modo che non si sovrappongano al setto: un'escisione troppo abbondante potrà condurre, per converso, ad una cicatrizzazione del setto e delle cartilagini, con la creazione di un naso schiacciato e disturbi della respirazione nasale.

All'operazione plastica del naso va spesso associata un' operazione plastica del setto. Una completa asportazione del setto, con successivo reimpianto, conduce non solo ad eccellenti risultati cosmetici, ma migliora un'ostruzione nasale.

L'A. passa infine a descrivere il trettamento del lobulo. Possibili complicazioni derivano specialmente da un'asportazione indiscriminata della cute e della cartilagine vestibolare. Ne conseguono deformita' varie, che possono essere corrette da trapianti cutanei e cartilaginei.

Le complicazioni postoperatorie sono rare: debbono essere trattate conservativamente. La chemioterapia profilattica e' particolarmente indicata qualora i tessuti vengano eccessivamente traumatizzati e nei trapianti.

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Incision for Exposure of the Gallbladder

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A "PHYSIOLOGIC" incision for exposure of the gallbladder and bile ducts is the basis of this presentation. Originality is not claimed, for the incision is but an adaptation at a particular site of recognized principles used elsewhere. Nor is priority claimed, for it is quite possible that it has been described before, though I have been unable to find it in the textbooks and treatises on operative surgery or in the recent surgical literature to which I have had access. I have found the incision very useful and should like to call it to the attention of other surgeons. I am submitting this description for publication with the hope that some reader may be able to inform me as to the name of its originator and the place of its origin and first description.

Dissatisfaction with the old leads to trial of the new. More than twenty years ago, as a junior intern holding the retractor, I first noted the disadvantages of the traditional upper midline or right paramedian incision. The strong pull on the retractor needed to displace the right upper abdominal wall not only affected the arm of the intern but was likely to damage the patient's liver—the inner end of the retractor blade either lifted up the liver or rubbed on its anterior surface. The surgeon's temper was also affected at times, for, unless the patient's abdominal wall was weak or deeply anesthetized, even vigorous retraction often failed to give consistently good exposure. The result of the struggle was that the patient had both the effects of deep anesthesia and a very sore abdomen to endure next day.

While on leave in America in 1943, I worked for a certain period as an industrial surgeon. At a time when we were sorely pressed for workmen, I had to reject for foundry work (and divert to a lighter job) a man who was a perfect specimen except for a bulge in his right upper abdominal quadrant, which accompanied a well healed scar of a 4-inch (10 cm.) Kocher incision.

As I look back, these seem to be the points of departure in my search for an ideal gallbladder incision. Several stages, however, contributed to the development of the incision presented here.

1. About ten or twelve years ago, operating on a 10-year-old boy in whom, after a relapse of typhoid fever, acute hydrops of the gallbladder had developed, I used a McBurney type muscle-splitting incision (with local anesthesia) placed immediately over the distended and palpable gallbladder. I was impressed with the ease of exposure, the lack of any necessity for vigorous retraction, the fact that no retraction in the direction of the liver was needed, and the rapid healing and strong abdominal wall that resulted despite the necessity for prolonged drainage after the cholecystostomy. I have continued to use this approach when cholecystostomy was clearly indicated before operation, and I recommend it highly.

2. At the same time and thereafter I gradually shifted to the use of the longitudinal-through-skin and transverse-through-rectus-sheath-and-rectus-muscle incision of Sloan and the straight transverse supraumbilical incision (sometimes called the Gurd incision or Sander's incision) for most of my operations in the upper abdominal region, including a number of cholecystectomies. These methods of approach showed that an improved exposure could be gained by cutting the rectus muscle and sheath transversely, and that there was no danger in cutting the muscle if the nerve supply was not damaged and the sheath well repaired. But retraction in the direction of the liver was still needed, even though it did not need to be applied as vigorously as with the longitudinal incision.

However, in 1946, I had a patient scheduled for cholecystostomy, and I exposed the gallbladder by the muscle-splitting approach. Ex-

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ploration of the ducts and cholecystostomy proved to be indicated. Extension of the incision across the right rectus muscle and its sheaths gave the necessary additional room and exposure and produced the incision here described, which I have found most satisfactory for cholecystectomy and surgical treatment of the bile ducts. The details of technic are shown in the accompanying illustration.

TECHNIC

Cutaneous Incision.—A curvilinear incision starts from just above the right costal margin at a point immediately over the palpable gallbladder, or, if the organ cannot be felt, at a point where the fundus of the gallbladder is expected to lie. (This is usually between 1 and 2 inches (2.5 and 5 cm.) to the right of the junction of the lateral border of the right rectus muscle with the costal margin.) The incision then curves downward and across the abdomen, passing about an inch (2.5 cm.) above the umbilicus and ending about the same distance to the left of the midline, the latter part of the incision being horizontally transverse.

External Oblique Aponeurosis.—This layer is split in the direction of its fibers from the costal margin downward and medially, and this splitting is continued across the anterior rectus sheath to the midline, still following the direction of the external oblique fibers in that sheath.

Internal Oblique Muscle and Sheath.—These are cut across in the same direction as the splitting of the external oblique fibers.

Rectus Abdominis Muscle.—Whether the anterior sheath has been cut across obliquely or transversely will depend on the width of the upper part of the abdomen and, therefore, on the direction of the external oblique fibers. In any case, however, the right rectus abdominis muscle is cut transversely. This is best done with a scalpel, cutting across with a series of shallow cuts while the left index finger elevates the muscle away from the posterior sheath. This allows pressure to be exerted on the inferior epigastric artery (which may be multiple rather than single) and involves very slight loss of blood while the artery is being doubly clamped, cut and ligated. (Note: There is frequently also a small artery at the outer border of the rectus sheath which needs to be clamped.)

Posterior Rectus Sheath, Transversalis Muscle and Fascia and Peritoneum.—It is most convenient to incise these structures together, in the same line as the rest of the incision.

Retraction.—Because of the cutting of the rectus muscle and the cutting or separation of the other muscles, the wound gapes open. This gape can be increased and the exposure improved if a small sandbag or pillow has been placed beneath the right lumbar region before draping the patient. The sides of the wound can be held open to the extent desired with a two-hook self-retaining retractor of the Balfour type.

The stomach and the colon will usually be held out of the way by the same means. If necessary, however, separate deep retractors can be used for gentle retraction on these organs. A flat flexible blade retractor can then be used for internal retraction of the duodenum if necessary.

It will thus be seen that there is no retraction necessary in the direction of the liver.

Exposure (accompanying illustration, *E*).—The bile ducts in their entire length, as well as the gallbladder, are well exposed, and a careful dissection can be carried out for either exposure of the common duct or removal of the gallbladder.

It is unnecessary here to discuss the technic of cholecystectomy. This operation has been well described in a number of recent books and articles, which call attention to the frequency of variability in the arrangement of both cystic artery and bile ducts.

Closure (see illustration, *F-H*).—Before closure is started, hemostasis is checked, the sponge count made and the sandbag or pillow is removed from under the patient. Closure is still easier if the head and neck of the patient are raised and the knees flexed.

Peritoneum: The peritoneum is closed with a continuous suture of No. 40 cotton (or No. 30 if there is any tension). The transversalis fascia and muscle and the posterior rectus sheath are also included in this layer in the ordinary case. If there is an unusually well developed transversalis muscle, only the fascia is included with the peritoneal suture, and the

muscle and its anterior sheath may be approximated with three or four interrupted cotton (No. 40) sutures as a separate layer.

Internal Oblique Muscle: The cut edges of this muscle and its sheath are accurately approximated with several interrupted No. 40 cotton sutures, the line of sutures extending right up to the lateral edge of the rectus sheath.

External Oblique Aponeurosis and Anterior Rectus Sheath: No attempt is made to draw together the cut ends of the rectus muscle, but closure of the rectus sheath is accurately made with interrupted cotton (No. 30) sutures, and sutures of the same type are continued along the aponeurosis up to the costal margin.

Fat and Subcutaneous Fascia: If this layer is very thick, a few tension sutures of cotton (No. 30) are placed through the skin and subcutaneous layer and are tied over a strip of gauze after the placing of the skin sutures.

Skin: Interrupted cotton sutures (No. 40) are used. The end sutures and the one in the center are left long, and these are tied over a small roll of gauze, which covers the suture line. Then another small gauze compress is placed over this and the whole dressing is covered and fastened in place with two strips of adhesive plaster 1½ to 2 inches (3.7 to 5 cm.) wide, which are placed in the same direction as the wound, and extend 2 or 3 inches (5 to 7.5 cm.) beyond the dressing on both sides.

A large dressing is avoided, and no binder is used. One can then easily detect any abnormality in the region of the wound or in the abdomen.

Drainage.—I rarely use drainage after cholecystectomy. If it is indicated, a roll of rubber tissue is used as a drain and is led out at the upper end of the incision, which is usually the most direct and shortest course for it. Occasionally a stab wound is made lateral to the wound if that seems a more direct route for the drain (or for a common duct drainage tube).

Mobilization and Ambulation.—This incision and its closure are admirably suited to early ambulation. The patients move around in bed as soon as they come out of anesthesia, sit up (and usually walk around the bed) about six or eight hours after operation and walk twice on the next day.

SUMMARY

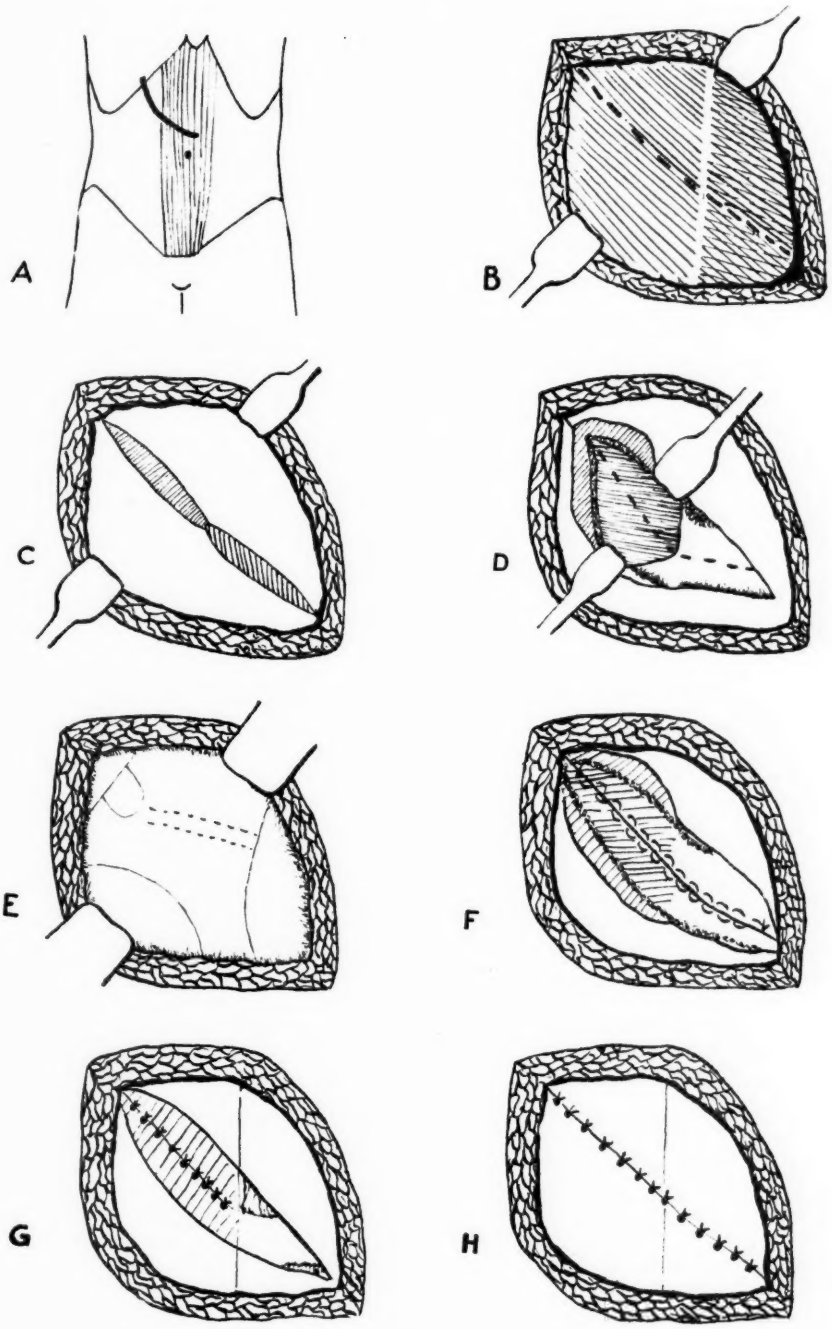
A technical description is given of a "physiologic" incision of the gallbladder. The advantages of this incision are quite evident:

1. It is placed immediately over the parts to be exposed.

2. The wound tends to gape open because of the cutting of the rectus muscle and its sheaths and the cutting or separation of the muscles attached to that sheath. Neither vigorous retraction nor very deep anesthesia is needed.

3. Retraction of the abdominal wall is tangential to the edges of the liver and can be done with a self-retaining retractor. A bent ribbon retractor of the Crile type in the lower angle of the wound can be used to hold the colon or the duodenum out of the field.

"Physiologic" incision for exposure of gallbladder and bile ducts. *A*, cutaneous incision from just beyond costal border, over gallbladder, to a point about 1 inch (2.5 cm.) to left of midline. *B*, incision in external oblique aponeurosis and muscle, and in anterior rectus sheath, in the direction of the fibers. *C*, incision *B* opened to show internal oblique and rectus muscles. *D*, internal oblique muscle cut across in the line of the previous incision (i.e., perpendicular to its fibers) and rectus muscle cut transversely (i.e., perpendicular to its fibers). See text about precautions. Incision to be made in transversalis muscle, transversalis fascia, peritoneum and posterior rectus sheath is indicated by the dotted line. *E*, exposure of the liver edge, gallbladder, common bile duct (dotted lines), duodenum and transverse colon. Note that there is *no* retraction toward the liver and gallbladder. *F*, closure of peritoneum, transversalis muscle and fascia, and of peritoneum and posterior rectus sheath with continuous suture of No. 40 cotton (No. 30 is occasionally used). *G*, closure of fascial envelope of internal oblique muscle and approximation of muscle edges with interrupted sutures of No. 30 (or No. 40) cotton. *H*, rectus muscle *not* sutured. External oblique aponeurosis and anterior rectus sheath are sutured with interrupted cotton No. 40 (or No. 30) sutures. Sutures of the same type are used for closure of the skin (not shown).


A
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H

4. Any retraction of a low-lying liver that may be necessary is done by gentle retraction of the liver only. The abdominal wall is open up to the costal margin, and no upward abdominal wall retraction is needed.

5. A strong abdominal wall results, which is quite suited to early ambulation and in which there is very little likelihood of herniation if accurate repair of all muscle sheaths is done with fine cotton or silk sutures; for, although the rectus abdominis, internal oblique and transversalis muscles are cut across, there is no damage to the nerve supply and the essential blood supply of these muscles. (The same care in ligation and cutting of the deep epigastric artery just behind or in the rectus muscle must be used, as in all transverse incisions that cut this muscle.)

A trial of this incision is recommended and a report of experiences requested. My own experience has been most satisfactory.

RÉSUMÉ

On fait une description technique de l'incision "physiologique" de la vésicule biliaire. Les avantages de cette incision sont bien évidents.

1. Elle se fait immédiatement sur les parties qui doivent être exposées.

2. L'incision reste spontanément ouverte en raison de la section du muscle droit et de sa gaine et de la section ou de la séparation des muscles qui s'insèrent sur cette gaine. On n'a besoin ni d'une rétraction importante, ni d'une anesthésie très profonde.

3. La rétraction de la paroi abdominale est tangentielle aux bords du foie et peut être réalisée avec un rétracteur auto-statique. Un rétracteur à ruban incurvé du type de Crile peut être employé dans l'angle le plus bas de l'incision pour maintenir le colon ou le duodénum en dehors du champ opératoire.

4. Toute rétraction du foie situé plus bas, qui pourrait être nécessaire, est faite seulement en réclinant prudemment le foie, car la paroi abdominale est ouverte jusqu'au rebord costal et on n'a pas besoin d'avoir un réclinement de la paroi abdominale au-dessus.

5. On obtient ainsi une paroi abdominale forte qui est tout à fait adaptée à une reprise précoce de la marche, et elle a peu de chance d'être favorable à la production de hernies si la réparation minutieuse de toutes les gaines des muscles est effectuée avec des sutures au coton ou à la soie; car, bien que le droit abdominal, l'oblique interne et les muscles transversaux soient incisés, on ne produit aucune lésion dans l'innervation et dans la vascularisation de ces muscles. (On doit faire avec le même soin la ligature de la section de l'artère épigastrique profonde, juste derrièrre ou à l'intérieur du muscle droit, comme dans tous les autres incisions transverses coupant ce muscle.)

Il serait bon d'essayer l'emploi de cette incision et d'en donner les résultats. Ma propre expérience a été des plus satisfaisantes.

RESUMEN

El autor describe técnicamente una incisión fisiológica de la vesícula biliar cuyas ventajas son las siguientes:

1. Se realiza inmediatamente encima de las partes sobre las que se desea operar.

2. Como quiera que la incisión corta el músculo recto y sus vainas, y corta o separa los músculos insertados en dichas vainas, la herida tiende a mantenerse ampliamente abierta. No se necesita usar una retracción intensa, ni tampoco se precisa de una anestesia muy profunda.

3. La retracción de la pared abdominal se realiza tangencialmente a los bordes del hígado, y puede hacerse con un retractor que se mantiene por sí solo en posición. Para separar el colon o el duodeno del campo operatorio puede emplearse un retractor de cinta del tipo Crile, situándolo en el ángulo inferior de la herida.

4. Puede realizarse cualquier retracción que sea necesaria en el hígado cuando éste se halla en una posición baja, haciéndola suavemente sobre el hígado mismo, ya que la pared abdominal está abierta hasta el reborde abdominal, por lo que no se necesita retraer hacia arriba la pared abdominal.

5. Como resultado de la operación se consigue una pared abdominal fuerte y resistente y por lo tanto apropiada para la deambulacion precoz del paciente, existiendo muy pocas posibilidades de hernia si se reparan de un modo apropiado todas las vainas musculares mediante suturas con algodón o seda fina. Aunque se seccionen transversalmente los rectos abdominales, oblícuo interno y transversos, lo

se lesiona la inervación ni la irrigación de dichos músculos. Debe practicarse con el mismo cuidado la ligadura y sección de la arteria epigástrica profunda inmediatamente detrás o dentro del músculo recto, en todas las incisiones transversales que cortan este músculo.

Se recomienda el ensayo de esta incisión, y que quienes la practiquen comuniquen sus experiencias, ya que la opinión del autor sobre esta incisión es altamente satisfactoria.

RIASSUNTO

Descrive la tecnica di un'incisione "fisiologica" della cistifellea. I vantaggi di quest'incisione consisterebbero:

1. Nel fatto che essa cade immediatamente sopra la parte che deve essere asportata:

2. Nella circostanza che la ferita tende ad allargarsi spontaneamente in seguito all'incisione del muscolo retto e delle sue fascie, nonche' all'incisione o la separazione dei muscoli attaccati alle fascie stesse. Non si rendono quindi necessarie ne' una profonda anestesia, ne' una forte retrazione strumentale:

3. Nella formazione di una cicatrice addominale molto resistente, la quale consente una precoce deambulazione. La possibilita' di un'ernia laparatomica e' minima qualora la sutura della fascie muscolari venga eseguita accuratamente con cotone o seta. Per quanto i muscoli retti, gli interni obliqui ed i trasversali siano tagliati trasversalmente, non si compromette infatti l'innervazione locale, mentre viene mantenuta un'adeguata circolazione del sangue (grande cura deve essere naturalmente esercitata nel tagliare e legare l'arteria epigastrica profonda che decorre subito dietro o nei muscoli retti).

L'A. si dichiara soddisfatto di questa nuova modalita' tecnica, che raccomanda per il futuro.

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Treatment of the Duodenal Stump in Gastric Resection

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HISTORICALLY, gastric surgery is not new. Billroth first described his Type II procedure in 1885 and his Type I procedure four years earlier. According to the literature, however, Kronlein performed the first end-to-side antecolic gastrojejunostomy following subtotal gastric resection in November 1887. This procedure, which was first suggested by von Hacker in 1885 after investigative work by Polya, with whom he was then associated, has met with increasing popularity in the past few years. Various other procedures and modifications by such able pioneer surgeons as Polya, Billroth, Pean, von Hacker, von Eiselberg and W. J. Mayo soon appeared in the literature; in fact, some of these surgeons were performing somewhat similar surgical procedures on their own initiative at the time Kronlein first made his work known. The survival percentage for gastric operations remained low until approximately 1910, at which time improvement in anesthesia, surgical technic and preoperative and postoperative treatment brought about great improvements. During the past twenty years, and especially during the past ten, further great advances have been made in preoperative and postoperative treatment, lowering the mortality rate to such an extent that gastric resection is now a fairly common operative procedure and is done by surgeons throughout the country. Preoperative and postoperative supplemental feedings of Vitamin C, the establishment of electrolytic balance, the free use of whole blood and plasma, the restoration of protein balance—all these, plus continuous gastric suction and the use of penicillin, streptomycin and Sulfa drugs, have played no little part in lowering the mortality rate and are now regarded as essential to good surgical treatment of the stomach. Without such an armamentarium, there would surely be a rapid increase in the present favorable mortality rate.

There are many pitfalls awaiting the gastric surgeon. One of the most distressing of these is disruption of the duodenal stump. Probably every surgeon who has done any appreciable number of gastric resections has at some time encountered this complication, than which few acute postoperative complications are more distressing or more serious. The mortality rate, even with adequate drainage, is very high; and, of course, without adequate avenues of escape of the duodenal contents from the peritoneal cavity, the mortality rate is approximately 100 per cent. The development of a duodenal fistula is therefore an extremely serious surgical complication. Such fistulas are most likely to occur after gastric resection of the Billroth II type.

There are several causes of duodenal fistula, but this paper is limited to the discussion of fistulas complicating gastric resection.

The most common cause of duodenal fistula is a technical defect in duodenal closure. This, as a rule, is brought about by one of the four following factors or a combination of one or more:

1. The duodenum proper is treacherous material for suturing, since its posterior wall is void of peritoneal covering.

2. The posterior muscular wall is very thin and easily cut through with suture material. The presence of an ulcer on the posterior wall further increases the friability of the adjacent tissue.

3. Pancreatic and gastric juices and enzymes may have a digestive effect on catgut suture material resulting in rapid absorptive action by hypoproteinized tissue.

4. Increased intraduodenal pressure may result from distention due to postoperative atony or to the forceful injection of gastric contents back into the afferent loop.

Should a disruption of the suture line occur, one of two things may be expected: (a) the patient will die from a generalized peritonitis or (b) a duodenal fistula will develop.

The presence of a fistula is soon recognized by the thin, bile-stained, highly irritating obtained by drainage. There is a marked and

rapid loss of strength, paralleling the rapid loss of fluid, pancreatic juices and body protein. If the fistula is small and all back pressure is promptly relieved by gastric suction the lesion may heal spontaneously. If the lesion is large, death usually ensues in a short time.

TREATMENT

Treatment, both conservative and surgical, is far from satisfactory. Conservatively it is necessary to protect the skin area as carefully as possible, using such soothing dressings or other medications as are indicated, and at the same time restricting fluids and foods given by mouth. Intravenous and rectal fluids, high in protein and salts, should be adequately administered. If this treatment is not adequate and operation is elected—or forced, which is a more apposite term in such cases—it must be thoroughly recognized that any further surgical intervention is usually performed on a poor surgical risk. Furthermore, the operation must be done in an area in which the tissue is even poorer for surgical repair.

Should surgical intervention be decided upon, the surgeon may elect one of three procedures:

1. If the fistulous tract is sufficiently well formed, then entire tract may be shunted into the lumen of the stomach. This, when possible, is the operation of choice.

2. One may attempt to restore the stump of the duodenum. This, as a rule, is difficult and frequently unsatisfactory, owing to edema, irritation of the tissue and secondary infection.

3. A Witzel type duodenostomy may be performed, a small catheter being inserted into

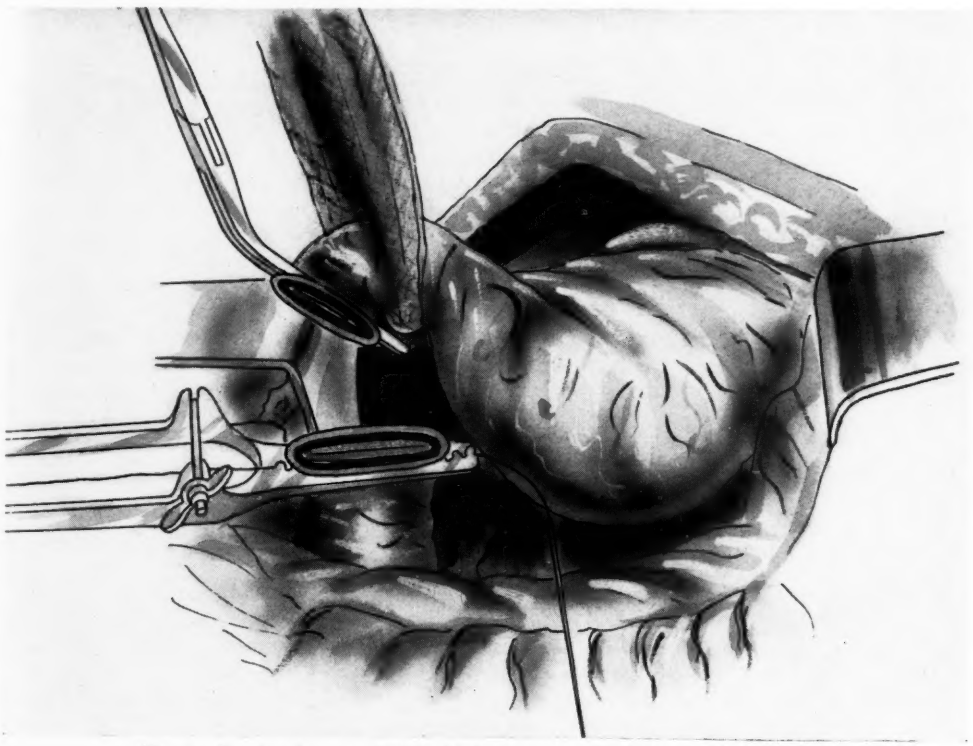

Fig. 1.—Furniss clamp applied to duodenum perpendicular to long axis of body.

the midportion of the second part of the duodenum. A sump pump suction may then be employed. This not only results in controlled drainage with relief of pressure on the duodenal stump but eliminates the irritating effect of the duodenal drainage on the skin. The captured ferment may be restored to the gastrointestinal tract through a nasal tube, thereby assisting in maintaining electrolytic balance and returning the necessary salts, ferments and protein to the body. Should the patient survive, it will become necessary to do a third operative procedure to close the new opening. This should be comparatively simple, since the new opening is easily accessible and is on the portion of the duodenum covered by peritoneum.

The problem, therefore, is to forestall such complications as have been mentioned and to avoid any secondary operative procedure in this area. In order to do this, the surgeon must be entirely familiar with the anatomy of the duodenal area and adjacent structures. He must be able to effect closure in such a manner that even unwarranted back pressure will not be sufficient to cause a disruption or a leak in the suture line. Regardless of what type of repair is effected and regardless of the pathologic condition present, whether it is carcinoma, gastric ulcer, duodenal ulcer, or benign or malignant pyloric obstruction, one thing is essential—that satisfactory closure of the duodenal stump must be attained.

As is well known, the duodenum is not covered by peritoneum on its posterior wall except in the immediate first portion of the first part. The muscular coat and the mucosa of the posterior wall are, therefore, easily torn.

The common duct lies immediately beneath the midportion of the first part, although it enters the second portion of the duodenum along with or adjacent to the pancreatic duct.

The gastroduodenal artery lies immediately behind the proximal part of the first portion of the duodenum. The right gastric artery and vein cross laterally over aforementioned area. The pyloric branches of both right gastric and gastroduodenal arteries freely supply the first portion of the duodenum. Careful hemostasis, therefore, is essential, as bleeding into the tissues of this area definitely precludes satisfactory closure.

Fig. 2.—Incision made along anterior wall of duodenum to facilitate exposure and closure of duodenal stump with exclusion of ulcer.

The freeing of the duodenum is a matter of the surgeon's personal preference. It may, of course, vary with the pathologic condition. Most surgeons prefer to divide the gastrocolic omentum, first freeing the greater curvature at least in part. A corresponding opening is made into the gastrohepatic omentum, and the stomach is then lifted upward to facilitate further maneuvers. Division of the separate portions of omentum and control of bleeding are then completed in such manner as the surgeon prefers. Once the pyloric end of the stomach is freed and mobilized, the duodenum may be much more satisfactorily approached.

The proper handling of the duodenal stump involves several factors determinable only at the time of operation. Needless to say, the closure must be surgically competent regardless of the condition present and the type of operation employed.

For the sake of clarity, cases of disease requiring gastric resection may be classified into two divisions: (1) cases in which the condi-

tion of the first portion of the duodenum permits free mobility to be easily attained, and (2) cases in which difficulty is encountered in freeing the posterior wall of the first portion of the duodenum.

Cases in the first classification are usually those in which resection is being done for a lesion of the stomach or a lesion on the anterior wall of the duodenum.

In such cases I have used most satisfactorily a Furniss clamp type of closure. The clamp is placed across the duodenum in such a manner that the instrument is perpendicular to the long axis of the body. A long atraumatic needle is placed through the groove in the Furniss clamp; the gastric side is closed with an angle forceps. Division is then made with the scalpel to avoid devitalization of tissue, which may occur after use of the actual cautery. The gastric segment is then covered with a rubber cuff or with sterile gauze and is reflected from the operative area. The stump is treated with a germicidal solution, preferably alcohol, before closing. After division of the duodenum the suture is pulled through the Furniss clamp; the clamp is then released, and the suture ends are snugly and securely tied. Two additional layers of interrupted No. 00 chromic catgut sutures are then applied, inverting the stump and, at the same time plicating the posterior wall. Care must be exercised in placing the posterior sutures so that the suture is not placed back of that portion of the duodenum which is not covered by peritoneum; if this is done, it may weaken the thin muscular coat and result in a suture perforation due to necrosis. An additional and similar layer of interrupted silk sutures is placed as a final safeguard. The loose ends are severed, and the stump is allowed to drop back into whatever position of rest it assumes normally. No further effort is made to suture omentum or fat over the suture line. In my opinion, this repair is adequate and fibrin will coat the suture line over in a few hours. Suture of the stump to the head of the pancreas, as is done in some cases, is not necessary or wise when good closure can be effected without it.

Cases in the second classification, those in which difficulty is encountered in mobilizing the first portion of the duodenum, make thorough evaluation necessary. It is well known that long-standing and intractable duodenal ulcers sometimes penetrate through the posterior wall into the head of the pancreas and which can be freed only with difficulty or not at all.

Some highly competent surgeons, when dealing with such a condition as this, merely divide and close the duodenal stump above the lesion, proceed with resection of the pyloric antrum and leave the ulcer to heal of its own accord once the acid-bearing area of the stomach is removed and the gastric contents diverted.

Bancroft's modification of the Finsterer resection is one of the most successful as well as one of the most ingenious of the accepted methods of closure in difficult cases. Bancroft divides the pyloric end of the stomach ap-

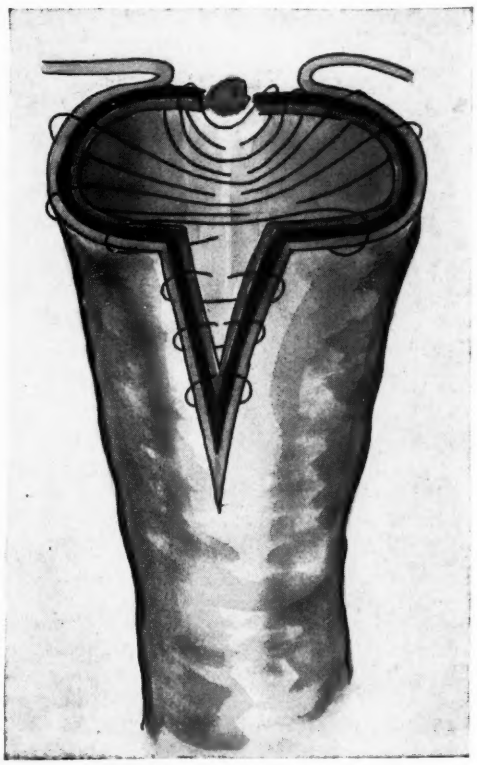

Fig. 3.—Method of placing interrupted sutures in anteroposterior direction, closing stump and excluding ulcer area.

proximately 1 inch (2.5 cm.) above the pyloric ring. The mucosa is then carefully reflected away from the muscularis as far down as possible and securely closed with a single encircling ligature. The muscularis and serosa are then closed with interrupted inversion sutures. The ulcer area is below the closure, and the ulcer remains undisturbed.

Another ingenious method of closure in difficult cases, and one to which I have resorted in several instances, is that developed by McNealy of Chicago, who, after closing the stump in certain difficult cases, further protects it against disruption by progressive plication of layers of interrupted sutures along the lateral walls until the divided end of the stump is practically occluded by lateral and anterior pressure layers.

These procedures, while effective and indicated in certain cases, do not altogether meet the requirements of modern surgical standards, especially where previous hemorrhage has been noted and when an operation of the magnitude of gastric resection is being done. Many well-known surgeons have made excellent contributions, and the methods of closure advocated by them have definite advantages in many cases. I have found, however, that in cases like those here mentioned, my most satisfactory results have been obtained by open stump closure. The procedure is as follows:

The pyloric end of the stomach and the immediate first portion of the duodenum are freed in the usual manner; the area is well walled off with moist packs; an angle forceps is placed across the most distal portion of the freed pyloric or duodenal area. The opposing lateral walls of the duodenum are held with Judd-Allis forceps, care being taken not to catch any tissue deeper than the peritoneal covering of the duodenal wall. The stump is then divided with the scalpel distal to the angle forceps, the end of the duodenum being left open. Suction is used to remove all duodenal contents from the open and exposed end of the duodenal stump. The divided section of the stomach is promptly covered and displaced from the immediate operative field. Bleeding vessels, if any, are securely ligated. A second incision perpendicular to the division, approximately 1 to 1½ inches (2.5 to 3.7 cm.) in length, is then made from the divided section of the duodenum, down the midportion of the anterior wall and directly opposite the site of the lesion. This gives an excellent view not only of the ulcer area but of the posterior wall below the ulcer. The ulcer area is then scarified, and a small section is removed for pathologic examination. Should there be evidence of bleeding, this may be controlled by coagulation or by fine atraumatic suture. The mucous membrane immediately distal to the ulcer is then caught in a fine chromic catgut suture, and closure of the mucous membrane and muscularis is effected in a posterior-anterior direction. The sutures are interrupted and are tied snugly but not tight. The second and third layers of interrupted sutures are placed in order immediately above the first row, with meticulous care in closing the posterior portion.

Next, the peritoneum-covered area of the duodenum is inverted by two similar layers of interrupted chromic catgut sutures followed by one layer of interrupted silk. The ulcer area is thus both excluded and firmly closed over. Adjacent fatty tissue is pulled over the stump as an added precaution. The remainder of the resection is carried out as conditions require. If, however, the afferent loop of jejunum is sufficiently long to encourage back pressure on the duodenal stump, it is wise to perform an entero-enterostomy at the most dependent segment of this loop of jejunum. This definitely relieves the duodenal stump of back pressure and allows normal healing during the first forty-eight to seventy-two hours, which is usually the critical period. Space does not permit discussion of the merits of entero-enterostomy in these cases. There are valid arguments both pro and con, and the particular situation may alter the surgical procedure.

SUMMARY

The author points out that technical descriptions of surgical procedures for attacking the duodenal stump are already numerous. They all have one definite purpose in mind, and that is a safe, effective and secure closure—one that will not leak, will not lead to suture necrosis of the duodenal wall, will not blow out under pressure, and offers the greatest margin of safety to the patient. It is best to know them

all, because difficulties are sometimes encountered that tax the ingenuity of the most capable surgeon.

Procedures are described with which, although slight variations are necessary in certain instances, the author has had good results in all cases of subtotal gastric resection except those in which a Billroth I Type operation is contemplated. This is an entirely different procedure and is not within the scope of this paper.

SOMMAIRE

L'auteur donne des descriptions techniques de différents procédés chirurgicaux pour fermer le moignon duodénal. Ces procédés sont nombreux Ils ont un but défini: une fermeture sûre, éfficace, n'offrant aucun danger, qui ne permettra aucune fuite, qui n'entraine pas le danger de la nécrose du siège de la suture de la paroi duodénale, qui ne cédera pas à une pression, anormale et qui offre le plus de sécurité aux malades Il est bon de connaître tous ces procédès car les difficultés qui sont souvent rencontreés moutrent l'ingénuité des chirurgiens les plus capables.

Les procédès de résections gastriques sous-totales, sont décrits l'opération de Billroth exceptée. Cette óperation est un différent procédé et hors des limites de nos rapports.

RIASSUNTO

Numerosi sono i procedimenti chirurgici rivolti ad una piu' perfetta chiusura del moncone duodenale. Tutti questi metodi hanno uno scopo ben definito: quello di assicurare una chiusura perfetta, che eviti il pericolo di spandimenti, di necrosi delle pareti duodenali, di diescenza sotto pressione. E' bene che il chirurgo sia a conoscenza di questi metodi, in quanto possono presentarsi talvolta delle difficolta' che richiedono una grande abilita' ed intraprendenza de parte dell'operatore.

Procedimenti chirurgici ottimi, che assicurano un risultato favorevole, sono stati descritti per ogni forma di resezione gastrica subtotale: nell'articolo non vengono pero' compresi quelli per l'operazione di Billroth I, in quanto non rientrano nello scopo del lavoro.

SUMARIO

El autor llama la atencion al hecho de que hoy en dia hay numerosos procedimientos para cerrar el tocón del duodeno, Todos tienen por objeto el evitar la necrosis de la pared duodenal y al mismo tiempo asegurar un metodo eficiente de sutura. Por esta razón el cirujano debe de familiarizarse con todos estos procedimientos, por cuanto de vez en cuando se presentan condiciones cuya solución requieren toda la ingenuidad del cirujano. Se han descrito todos los procedimientos de más valor en la resección subtotal del estomago, con excepciòn de los que se emplean en el método operatorio de Billroth No. 1, por cuanto este último método está fuera del proposito de este artículo.

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Treatment of Diabetes with Bilateral Alcoholization of the Splanchnic Nerves

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CLAUDE BERNARD'S idea of more than half a century ago, according to which the cure for diabetes must be directed toward the nervous system, is being perfected today, with the specification that such treatment must be oriented toward the endocrine-sympathetic system.

After having sought, with negative results, the solution of this problem in the activation of the pancreas with inoculations, experimenters and surgeons have in recent years claimed to find it in the antagonism between pancreatic and adrenal hormones. In fact, it has been observed that an injection of epinephrine (equivalent to an excitation of the sympathetic nerve) causes hyperglycemia; on the contrary, diminution of the secretion of epinephrine always produces a decrease of glycemia.

On the basis of this biologic tie between epinephrine and insulin, and because of the fact that normal glycoregulation depends on the state of equilibrium between the antagonistic vagopancreatic and surrenosplanchnic systems, the cure of diabetes has already been attempted with adrenalectomy (Pieri, Sussi, Oppel, Chiasserini, etc.) and surrenal enervation (Donati, Ciminata, Gorachon, Simarro, Schmidt, Giordano, Crile).

Since the removal of one adrenal gland has proved insufficient because of the compensatory hypertrophy of the other, and the removal of both is not compatible with life, surgeons have tried to concentrate on the portion responsible for secretion of epinephrine, which is the medullary portion of the gland. As removal of this central part only proved technically difficult, if not impossible, the idea was advanced by Pende in 1926 that a physiologic medullectomy might be attained by severing the secretory nerve of the medulla (the splanchnic nerve).

It has actually been verified that in human beings, after such an operation or after simple anesthetic blocking of the splanchnic nerves, there appears a diminution of glycemia, even causing at times hypoglycemic crises (Stelling, Pieri, Lériche). On the contrary, excitation of the splanchnic nerve provokes hyperglycemia, probably through a discharge of epinephrine (Tournade and Chabrol, etc.).

In this respect it had already been observed how the puncturing of the fourth ventricle causes hyperglycemia and glycosuria only with the splanchnic nerves as intermediaries; because, if the splanchnic nerves on both sides are first dissected (Claude Bernard), or only the left side (Pollak), no glycosuria remains. Thus the splanchnico-surrenal system would constitute a complex causing hypoglycemia, antagonistic to the system causing hypoglycemia constituted by the vagus and the islands of Langerhans. Therefore the application of operations on the splanchnic nerve in the treatment of diabetes.

Having executed the splanchicectomy, some authors (Donati, Barronle, Curtis, Haverfield, De Takats, Chabanier, Bréhant and Donoso, etc.) have noted favorable results in cases of serious diabetes (often resistant to insulin), obtaining an improved tolerance of glucides and a greater sensitivity to insulin.

Stelling, Ciceri and Gabrielli were the first to attempt anesthetic blocking of the splanchnic nerves in the treatment of diabetes. They obtained hypoglycemia (though it was often temporary), and this effect was attributed by them to cessation of the action of epinephrine due to blocking of the nervous stimuli of the adrenal glands.

Bréhant (1939) thought of combining anesthesia of the splanchnic nerves with paravertebral anesthesia of the eighth, ninth and tenth dorsal roots of the right side (through which pass the sympathetic nerve threads going to the liver): thus, one would act not only upon

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the medullary action of the adrenal gland, which would be reduced, but upon hepatic glycogenesis, which would be obstructed. Hirscheporn and Popper have put into action the procedure suggested by Bréhant and have obtained a diminution of the initial glycemia.

Tosatti and Faelli (1939), practicing alcoholization of the left splanchnic nerve, have obtained a diminution of glycemia in diabetic patients and have been able to observe that the patients most sensitive to such treatment are those with hypertension and the clinical signs of medullary constitutional adrenalism. In fact, it is well known that among the various forms of diabetes there exists one, called diabetes mellitus, rather frequent, in whose genesis hyperadrenalinemia seems to be an important factor. Tosatti and Faelli maintained that blocking of the splanchnic nerve acts by inhibiting the adrenalino-genetic activity of the medullary portion of the adrenal gland, diminishing the amount of epinephrine present in the circulating blood.

Estella (1943) has also demonstrated that infiltration of the celiac plexus and the splanchnic nerves may be suitable in some cases of diabetes, especially when there is resistance to insulin, because of its proved restraining action on the sympathetic adrenal system causing hyperglycemia.

Recently (1947) Bongini and Adreani, of the school of Greppi, taking up the study of the syndrome of hypertension and diabetes on the basis of new concepts, were brought to admit a unitary pathogenesis, of neurohormonal order with an adrenal-hypophysical imprint. With regard to the surgical treatment, these authors maintained that "The various operations on the splanchnic nerves with a suprarenal-inhibiting effect (operation of Pende) find in these cases the most rational theoretical prerequisites for their practical realization. Already the brilliant results obtained by some Italian authors (Paolucci, Valdoni, Tosatti and Faelli) demonstrate that surgical therapy in this field should not be limited to some sporadic cases. Because, from its application we may have not only beneficial effects for the patient, but there may also derive the possibility to draw sure pathogenetic interpretations from it for such associated syndromes. Since it has been found that glycoregulation is undoubtedly influenced by the function of the splanchnic nerves, the question is therefore of immense interest, even if research in this regard is scarce and in its first stages. The results obtained in diabetes by means of blocking of the splanchnic nerves are still uncertain and at the most temporary, because of which it is not possible at the moment to pronounce a definite judgment concerning their efficacy."

Considering this, I have resolved to make a contribution to the therapeutic efficacy, in diabetes, of anesthetic and alcoholic blocking of the splanchnic nerves. I have executed this procedure bilaterally, which, so far as I know, has not been practiced up to now by other surgeons. In fact, as has been mentioned, alcoholization of the splanchnic nerves in cases of diabetes has been done by very few surgeons thus far, and by these has been performed only on one side.

Up to now I have pursued my investigations in a group of 12 diabetic patients, the majority of whom presented, besides, more or less conspicuous arterial hypertension. Two of them were resistant to insulin.

As far as the technic of infiltration is concerned, it was practiced by me within the following details: as material I have chosen needles with lumbar punctures, of small caliber, with rounded point, 10 to 12 cm. long; a 10-cc. syringe 1 per cent of novocain or a similar drug (recorcain, scurocain, etc.) or 1 per cent percaine, about 10 cc., alcohol 95 degrees pure, 1 to 2 cc.

The patient is seated on a table at such a height that the surgeon is not obliged to lean down.

The injection is made at the pointed apophysis of the first lumbar vertebra, which is recognized easily if one remembers that the horizontal tracing from one iliac crest to the other passes between the fourth and the fifth lumbar vertebra. Three finger breadths across from the outside of the pointed apophysis of the first lumbar vertebra the needle is driven in horizontally, mounted on a syringe filled with the anesthetic liquid. The needle is driven in at an angle of about 20 degrees, as though it were to reach the median line at a depth of 7 or 8 cm. One proceeds slowly, and the tissues are anesthetized along the way before they are

traversed. At a depth of 4 to 5 cm. the first bone contact is made, furnished by the transversal apophysis, which represents the location of an important point. Now one tries to bypass the transversal apophysis above or below; after this obstacle has been surmounted, the needle is driven in for about another 3 cm. until a second bone contact is made. With an adept and delicate movement, bending the needle slightly and withdrawing the point from the vertebral contact, one tries to place the needle tangentially against the antero-external face of the vertebral body, thence driving the needle in about 1 cm. It is now located in the premuscular cellular and retro-vascular layer where the sympathetic chain passes. Now about 10 cc. of anesthetic liquid is injected, after the surgeon has assured himself, by making the patient cough or by aspirating with the syringe, that no blood or liquid appears.

Proof that anesthetic infiltration has been achieved is given by a pleasant sensation of warmth manifested by the patient after about ten minutes, going progressively from the haunch to the foot. Thence one proceeds with the injection of 1 to 2 cc. of alcohol at 95 degrees.

Among possible accidents one must keep in mind are (1) puncture of a spinal root, which causes pain, and which can happen more easily if the puncture is executed too close to the median line; (2) puncture of the aorta or the vena cava, which happens rarely and is of no importance; it will be enough to withdraw the needle a few mm., and (3) puncture of the dura mater, a serious accident though fortunately rare; the needle must be withdrawn and one must assure oneself, by making the patient cough, that no liquid appears, and it is advisable to warn him that he may subsequently have headache due to the dispersal of liquid from the puncture in the fascular membrane.

In the patients treated by me, the infiltration was not executed ambulantly but after the patient had been admitted to the clinic. In one stage I have proceeded with the splanchnic blocking on one side, the next day, on the other.

While the procedure and the movements described above were being executed, the punctures were always well tolerated and I observed no accidents or complications. Only in a few cases was there a slight temporary indisposition with a tendency to lipothymia, which manifested itself immediately after the puncture and was due to the sudden drop in arterial pressure.

In the attached synoptic table I present the principal data resulting from my case histories.

The results I obtained can be summed up thus: in the 12 diabetic patients treated with anesthetic and alcoholic blocking of the splanchnic nerves favorable results were obtained (diminution of glycemia and of arterial pressure) in 9, while in the other 3 (cases 8, 11 and 12) the result was unsatisfactory in regard to glycemia as well as to blood pressure.

After the treatment I have also noticed, in cases in which the outcome was favorable, a diminution of glycosuria and an increase in the sensitivity to insulin, always a consequence of functional modifications of the adrenal glands. Furthermore, an improvement was noticed in subjective disturbances caused by hyperglycemia and hypertension.

The decrease of glycemia varied in the different cases, the values ranging from a maximum of 1.5 to a minimum of 0.3 Gm. per cent. The decrease of arterial pressure in some cases was notable, ranging from a minimum of 20 to a maximum of 40 milligrams of mercury.

Worthy of note is the fact that the variations of glycemia had a course parallel to that of the arterial pressure; patients whose condition was unchanged in regard to glycemia were unchanged also in regard to arterial tension.

The changes in glycemia as well as in arterial pressure were observed, in almost all cases, a few hours after infiltration of the splanchnic nerves. They became more evident after twenty-four to forty-eight hours, stabilizing themselves to almost constant values after about a week.

The improvement obtained in the diabetic patients treated by me has always been temporary; it has persisted in different cases for a variable period, from a minimum of three to a maximum of ten months. In some of the aforementioned cases I have repeated the anesthetic and alcoholic blocking of the splanchnic nerves—always bilaterally—ob-

Effect on Glycemia and Hypertension of Alcoholization of Splanchnic Nerves

Patient	Age	Diagnosis	Treatment	Sugar, Gm.%		Arterial pressure		Outcome
				Before	After	Before	After	
1 (M.C.)	46	Diabetes (5 yr.); moderate hypertension	Bilateral splanchnic alcoholization	1.59	0.99	170/90	140/75	Temporary improvement
2 (C.A.)	51	Serious diabetes (6 yr.); light hypertension	Bilateral splanchnic alcoholization	2.13	1.55	160/80	120/70	Improvement
3 (L.G.)	56	Diabetes (3 yr.); hypertension	Bilateral splanchnic alcoholization	2.10	1.80	190/90	150/75	Improvement
4 (M.M.)	60	Diabetes (8 yr.); hypertension	Bilateral splanchnic alcoholization	1.40	1.10	160/75	140/70	Slight improvement
5 (S.A.)	50	Diabetes (2 yr.); hypertension	Bilateral splanchnic alcoholization	2.70	1.65	190/90	170/80	Improvement
6 (R.V.)	63	Diabetes (6 yr.); hypertension	Bilateral splanchnic alcoholization	1.90	0.95	185/100	160/80	Slight improvement
7 (F.F.)	65	Serious diabetes (6 yr.); insulin-resistant	Bilateral splanchnic alcoholization	2.10	1.35	180/100	160/90	Improvement
8 (R.G.)	49	Diabetes (5 yr.); moderate hypertension	Bilateral splanchnic alcoholization	1.90	1.85	180/90	180/90	Unchanged
9 (C.M.)	52	Diabetes (12 yr.); hypertension	Alcoholization left splanchnic	2.10	1.30	170/80	150/70	Improvement
10 (N.A.)	58	Diabetes (2 yr.); hypertension	Bilateral splanchnic alcoholization	1.90	1.20	210/130	190/100	Improvement
11 (C.C.)	65	Serious diabetes (4 yr.); hypertension	Bilateral splanchnic alcoholization	2.40	2.45	170/80	160/70	Unchanged
12 (L.A.)	56	Diabetes (1 yr.); light hypertension	Left splanchnic alcoholization	1.45	1.50	160/90	165/90	Unchanged

serving in the majority a new decrease in glycemia and arterial tension. Treatment is in progress at this moment, and I hope to record the results in a subsequent note; from the ultimate results observed I shall perhaps be able to state positively whether repeating the infiltrations will bring about a permanent or only a temporary curative effect.

In conclusion, I can affirm that my preliminary investigations show that, in diabetic persons with associated hypertension or resistance to insulin, bilateral anesthetic and

alcoholic blocking of the splanchnic nerves induces lowering of the blood pressure and a decrease of glycemia in the majority of cases (9 out of 12). The decrease occurs with varying intensity and lasts several months; in some cases up to ten. It remains to be verified whether successive infiltrations will change this result from temporary to permanent.

The results obtained by me up to now, confirming the experience of other authors, encourage practice of blocking the splanchnic nerves in cases of advanced diabetes, especially if it is associated with hypertension or the patient is resistant to insulin.

SUMMARY

The author reports the results of his preliminary investigations with bilateral anesthetic and alcoholic blocking of the splanchnic nerves in the treatment of diabetic patients with associated hypertension. This technic resulted in a decrease in glycemia and a lowering of the blood pressure in the majority of cases (9 out of 12). Further investigation will determine whether repeated blockings will prove to be a means of permanent control. Thus far the results, though excellent, are temporary.

RÉSUMÉ

L'auteur nous fait part de son expérience du traitement des malades diabétiques par l'alcoolisation bilatérale des nerfs splanchniques. Il conclut en disant que cette thérapeutique encourage cette façon de procéder, bien qu'il reste à s'assurer si les infiltrations répétées sont capables de procurer une guérison permanente. Ainsi, en ce qui concerne les résultats, bien qu'ils soient excellents, ils sont temporaires.

RESUMEN

El autor comunica los resultados de sus investigaciones preliminares con el bloqueo alcohólico anestésico bilateral de los nervios esplácnicos en el tratamiento de los pacientes diabéticos con hipertensión asociada. Esta técnica determina un descenso en la glicemia, y también una baja en la presión sanguínea en la mayoría de los casos (9 de cada 12). Las investigaciones ulteriores determinaran si los bloqueos repetidos son un medio de dominar permanentemente estos síntomas. Los resultados obtenidos hasta la fecha aunque excelentes, han sido temporales.

RIASSUNTO

Ricerche preliminari condotte dall'A. dimostrano che il blocco bilaterale con anestetici e con alcool dei nervi splancnici conduce nella maggioranza (in 9 casi sopra 12) dei soggetti diabetici ed ipertesi ad una contemporanea diminuzione della glicemia e della pressione del sangue.

Indagini ulteriori potranno stabilire se il blocco ripetuto degli splancnici e' capace di condurre ad un controllo permanente delle due affezioni. Per quanto buoni, i risultati sono rimasti finora temporanei.

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Gastroesophageal Vagal and Sympathetic Innervation

In Relation to an Anatomic Approach to Combined Gastric Vagosympathectomy

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A REVIEW of the literature and a schematic outline of anatomic observations based on a series of 32 regional dissections will be presented.

Vagotomy, since its revival by Dragstedt in 1943, has been widely used in the treatment of peptic ulcer. The modern procedure, unlike the operation described two decades ago or earlier, is more comprehensive and is performed near the level of the diaphragm, either above or below it. Concurrent with the renewed appreciation of vagotomy has been a revival of investigative interest in the anatomic distribution of the nerves concerned.

Among recent papers on the morphologic character of the vagus nerves in relation to surgery are those of Chamberlin and Winship, Dragstedt, Doubilet and his co-workers, Weinberg and his associates, Bradley, Walters and Jackson. Some of these investigators (Bradley, Walters and Jackson), although conceding that the large nerve trunks alongside the esophagus under study were not entirely vagal but contained sympathetic components, stated that it was beyond the scope of their researches to delineate the associated nonparasympathetic fibers. Most authors, however, have ignored completely any constituent fibers that were not vagal.

In reference to the sympathetic components of the plexus gulae and the sympathetic distribution to the esophagus and the stomach proper, relatively few data are available, and those available are largely controversial. Opinion is divergent, ranging from an almost complete negation of the existence of a sympathetic distribution to the esophagus proper (Morris) to complete identification of the vagal trunks entering into the esophageal plexus as sympathetic branches from the cardiac nerve and other mediastinal structures (Kiss). Such workers as McSweney, Kiss, Duncan and others, writing some twenty to thirty years ago, reflected the prevailing disagreement on this score. For fairly detailed prevalent versions of the sympathetic nervous anatomy of the esophagus and stomach the reader is referred to the monographs of White, Potts, Kuntz, Knight and Mitchell. There is considerable diversity of opinion, however, among these authors as well.

Since an anatomically selective and complete gastroesophageal vagectomy or vagotomy leaves an unaltered and physiologically unopposed sympathetic innervation, a functional imbalance supervenes. A number of authors (Dragstedt; Kolk; Sweet) have attributed the unfavorable end results of vagotomy to this effect, a premise now under study by the writers of this article.

GASTRIC "NEURECTOMY" VERSUS VAGOTOMY

It becomes obvious that if the operative procedure called vagotomy actually accomplishes a sectioning not only of the vagus but of a large number of sympathetic nerve fibers, the term is a misnomer. Deferring to this possibility, some surgeons refer to the procedure as gastric neurectomy. However, in evaluating the clinical effects of the operation almost all authors restrict their description of effects to those that would be expected should only the parasympathetic fibers be interrupted.

We undertook this survey in order to determine the degree to which sympathetic fibers are severed by the usual surgical procedures collectively referred to as vagotomy. As the investigation proceeded, however, the concept developed that a combined vagosympathectomy might be a desideratum rather than an outcome to be avoided. The rationale of transabdominal combined gastroesophageal vago-

From the Surgical Services of the Brooklyn Cancer Institute, the Norwegian Hospital and the Beth-El Hospital.
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sympathectomy lies in the fact that there is a variable sympathetic component of the right and left gastric nerves as they descend from the plexus gulae (Braeuker; Bradley; Cannon; Hovelacque; Knight; Mitchell; McRea; Potts; Teitelbaum). Just below the gastro-esophageal junction the vagi may communicate further with gastric sympathetic nerves, as well as with recurrent vagal filaments from the celiac plexus. Incomplete vagotomy has been attributed, in some instances, to these interconnecting fibers. In general the sympathetic and parasympathetic systems are physiologic antagonists, and selectively eliminating the effect of one system will only intensify the action of the other. When sectioning of the gastric nerves, in those instances in which the descending periesophageal trunks have a significant sympathetic component, ablates the vagal effect completely and the sympathetic effect also to a large degree, the resultant motor-secretory activities of the upper part of the alimentary tract become more truly automatic or self-regulating.

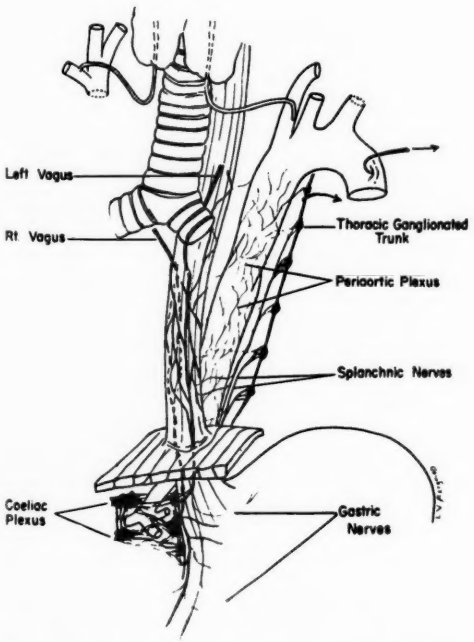

Fig. 1.—Anatomic diagram showing nerve distribution to middle and lower portions of esophagus.

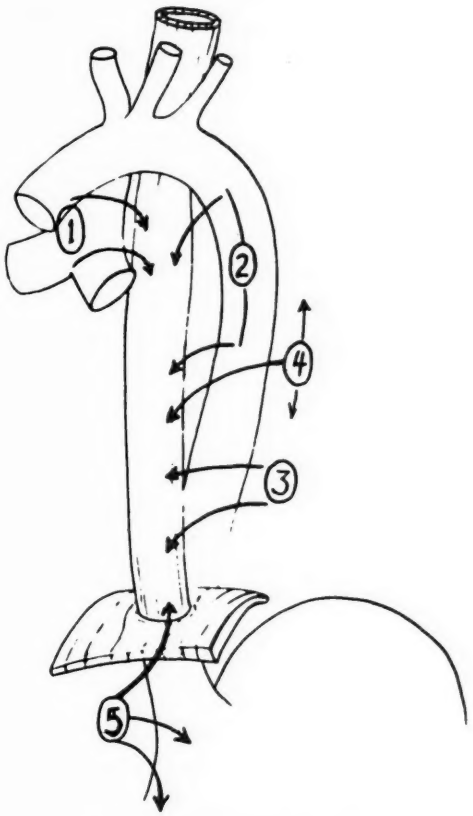

Fig. 2.—Major sources of *sympathetic nerve fibers* to middle and lower portions of esophagus. *1*, cardiac and bronchial plexi; *2*, periesophageal plexus (almost always present), few to many fibers; *3*, Splanchnic nerves, usually several fair-sized fibers; *4*, thoracic ganglionated chain; inconstant, variable, usually a few small fibers; *5*, cardiac plexus—along left inferior phrenic and upper branches of left gastric arteries. Sympathetic fibers from these sources always constitute a component, variable in extent, of the gastric nerves resected in so-called vagotomy.

Numerous reports apparently substantiate the fact that in selected cases of peptic and marginal ulcer vagotomy is a well established procedure of therapeutic value (Alvarez; Collins and Stevenson; Crile; Dragstedt; Weinberg; Harkins; Johnson and Machella; Meyer and Habnel; Miller and Olwin; Ruffin and

White; Walters). Disturbing major postoperative complications, however, reported by some authors to occur in more than one third of all cases, are severe postoperative distention, atony, diarrhea, fetid eructation, and dysphagia due to esophageal spasm. In a number of instances the distressing distention and atony, as well as other unfavorable side effects, may be due to the largely upopposed action of the sympathetics. This would apply particularly to cases in which a minimal number of sympathetic fibers descend with the nerves sectioned in the usual gastric neurectomy. Detailed tabular consideration of the incidence and degree of postoperative atony following vagotomy has been presented by Johnson, Moore, Warren, Ruffin, Dragstedt, Weinberg, Stein, Postlethwait, Collins, Miller, and their associates.

FUNCTIONAL GASTROENTERIC ANTAGONISM OF THE VAGI AND THE SYMPATHETIC NERVES IN RELATION TO SURGERY

When one considers the known antagonistic actions on the stomach and esophagus of the vagus and the sympathetic nerves, it becomes at least theoretically predictable that interruptions of the vagus neuromotor-secretory mechanism, if a largely intact sympathetic system is left, would in such cases lead to serious motor and secretory disturbances of the gastrointestinal tract. Alvarez expressed the opinion that the vagus and the sympathetic nerves act, in a sense, as counterbalancing brakes.

A tabular listing of the more generally reported and accepted actions on the stomach and esophagus of the vagus and the sympathetic nerves respectively would run as follows:

Vagus	*Sympathetic*
Increases tone	Decreases tone
Increases peristalsis	Decreases peristalsis
Accelerates gastric emptying	Delays gastric emptying
Relaxes sphincters	Contracts sphincters (cardia [?] and pylorus)
Increases acid secretion	Decreases acid secretion
Is primarily motor-secretory	Increases mucus secretion
Is a vasodilator (?)	Sensory afferent (pain perception)
	Is a vasoconstrictor

The esophagus and the stomach have a considerable degree of intrinsic automaticity in motor-secretory activity, mediated through Auerbach's and Meissner's plexuses. In sympathectomized human beings and in experimental animals subjected to vagotomy and thoracolumbar sympathectomy, little lasting disturbance in motility appears to have been noted, according to the reports of most workers (Alvarez; Cannon; Dragstedt; Grimson; Ivy; Postlethwait; Ray; Stein; White and Smithwick). Achalasia, or cardiospasm, as experimentally induced in animals by vagotomy, has been reported by Knight and Mitchell as preventable or curable by coupling with a sympathectomy performed by stripping the fibers along the celiac and left gastric arteries.

To combat the relatively great likelihood of postoperative abdominal distention and impaired gastrointestinal motility, a number of surgeons (Dragstedt; Moore; Priestley and Hallenbeck; Small; Womack and Crider) have combined vagotomy with gastroenterostomy as a so-called drainage procedure. Others, e.g., Jackson, have resorted to modified or "selective" vagotomy in an attempt to preserve the vagal innervation of the liver, pancreas and intestine. Still others have come to advocate coincident vagotomy and subtotal gastrectomy (Colp; Kolk).

In substantiation of the theory that coincident sympathectomy may forestall possible postvagotomy gastroesophagel sympathetic dominance and its resultant atony, the opinions of Sweet and Dragstedt are of interest. The former author has pointed out that pronounced gastric atony after esophagectomy and partial gastrectomy is relatively infrequent and moreover is observed least often after high esophagectomy. His explanation is that division of the gastrocolic and gastrohepatic omentum, caried to the pylorus, probably interrupts the main sympathetic nervous fibers which would otherwise become overactive because of the absence of the inhibiting action of the vagal fibers sacrificed in the course of the operation. Dragstedt stated that the local automatism of the stomach makes it possible for that organ to display its normal motility after all extrinsic nerves have been severed. Under normal conditions, however, its activities are under the influence of the vagus nerve and the sympathetic system, and in general the effect of the latter is antagonistic to that of the vagus. Sudden removal of the tonic

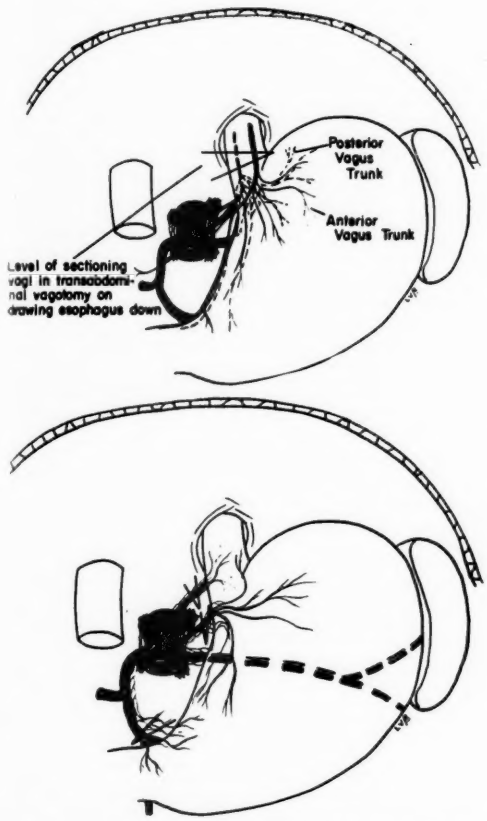
Posterior Vagus Trunk
Anterior Vagus Trunk
Level of sectioning vagi in transabdominal vagotomy on drawing esophagus down

Fig. 3.—Two diagrams illustrating the perivascular and hepatogastric distribution of the major gastroesophageal branches of the celiac plexus. The V's indicate points at which ligation of left gastric and inferior phrenic arteries, transection of hepatoduodenal ligaments and stripping of the gastroduodenal and right hepatic arteries would generally sever over 90 per cent of the celiac branches, thus largely sympathectomizing the stomach.

effects of the vagus nerve leads leaves the inhibitory influence of the sympathetic system unopposed, and the end result is, of course, a marked inhibition of the tonus and motility of the stomach. After a period of time, varying with different patients, readjustment of the peripheral motor mechanism occurs and the stomach's motility returns to its normal level. It is likely that it never regains the hypertonus and hypermotility so commonly observed in patients with ulcer. Both Kolk and Colp have demonstrated that residual gastrointestinal atony is minimal when vagotomy has been coupled with subtotal gastrectomy. Since the latter procedure involves ligation of the left gastric artery and incision of the lesser omentum, a concurrent sympathectomy, as will be noted later, has actually been carried out in such cases.

We advocate ligation of the left gastric artery and the left inferior phrenic arteries as an important maneuver in the technic of gastric vagosympathectomy. Both of these structures are in the immediate operative field of transabdominal supradiaphragmatic vagotomy and are readily accessible with the usual mobilization and exposure once the hiatus has been opened and the lower portion of the esophagus brought down. The left gastric artery is of course frequently and quite safely ligated in the majority of standard partial gastric resections, and the lesser omentum is routinely severed in operations on the stomach, with little ill effect. Sommervell, moreover, has recently advocated ligation of the arteries of the lesser gastric curvature *in toto*, and about five out of every six of the small branches running from the gastroepiploic vessels to the stomach walls, as a curative "physiologic gastrectomy" for the treatment of peptic ulcer. It should be noted to the contrary, however, that Baronofsky, studying the affects of multiple ligation of gastric vessels for peptic ulcer in dogs, found that no significant alteration of acid gastric secretion was produced, nor was the appearance of the gastric mucosa changed. However, the observations of Baronofsky confirmed those of Sommervell, Layne and Bergh, and Babkin and his associates in that the blood supply of the stomach can be adequately maintained if only one of the main arteries is left intact, despite the failure of such ligations to produce a uniform reduction in acidity. A puzzling note here is that ligations of the gastric artery and gastric neurectomies have both been employed to induce ulcers experimentally and have been advocated, on the other hand, as effective ulcer therapy.

White and Dragstedt expressed the opinion that the gastric sympathetic fibers are important chiefly as vasoconstrictors and visceral sensory nerves, being visceromotor to a lesser extent. One might conclude from the work of

Wolf and Wolff that increased vascularity and turgor, as demonstrated in cases of hyperemotionalism and possibly mediated through the vagi, renders the surface of the gastric mucosa more friable and susceptible to injury. On the other hand (Dragstedt, 1948), excessive vasoconstriction and local anemia, such as occur after sympathectomy, have also been postulated as factors in the causation of ulcer.

ANATOMIC CONSIDERATIONS

Dissections were made of 32 cadavers, all refrigerated, in whom death had occurred less than two days before. The anatomic studies were made in the course of complete necropsy, and no subjects were included in whom there existed disease or obesity of such a nature as to obscure the structures of the mediastinum or the upper part of the abdomen. Unless otherwise specified, the figures given are derived from this series of dissections. Corroborative or explanatory citations are often indicated by number. In studies of this kind, obviously no claims to originality can be made. Our intent is rather to collate and amplify the widely scattered and somewhat inaccessible information available as to the sympathetic innervation of the esophagus and the stomach in its functional and anatomic relation to the parasympathetic supply.

DATA ON ANATOMIC STUDY

For the purposes of brevity and clarity our descriptive data are presented chiefly in tabular fashion or in association with the accompanying illustrations.

Vagal Distribution, Esophageal.—This distribution extends descends from the retrohilar plexus as trunks:

Number of trunks		*Number of Cases*
Right	Left	
2	2	24
1	1	3
2	1	2
1	2	2

The trunks generally form a loosely meshed periesophageal plexus gulae (this was present in 30 cases and absent in 2). The plexus gulae, 1 to 5 cm. above the hiatus, re-forms into anterior left and posterior right cords crossing the gastro-esophageal junction. (Occasionally 1 or 2 are imbedded in the musculature.)

Number of cords		*Number of cases*
Right	Left	
1	1	22
1	2	6
2	1	2
2	2	2

Vagal Distribution, Gastric.—The left (posterior) vagus divides in the main into four groups of branches, radiating from the lesser curvature:

(a) Gastric—about half of bulk distributed as 3 to 8 or more branches to gastric wall
(b) Pyloric—to pylorus, along lesser curvature
(c) Hepatic—to porta hepatis along hepatic artery
(d) Celiac—along left gastric artery to celiac ganglion

The right (anterior) vagus divides into two main groups of branches:

(a) Gastric (lesser number) to stomach
(b) Celiac (greater number) about two thirds of total bulk, to celiac ganglion

Sympathetic Distribution, Esophageal.—A variable number of filaments pass to the esophagus, usually entering the plexus gulae from the following sources:

Source	Many filaments	Few filaments	None
Periaortic plexus	21 cases	8 cases	3 cases
Splanchnic nerves	4 cases	11 cases	21 cases
Ganglionated trunk	2 cases	18 cases	12 cases

Rami ascending from the cardia are derived from the celiac ganglion via (1) the left inferior phrenic periarterial plexus (28 cases) and (2) the left gastric periarterial plexus (all cases).

Sympathetic Distribution, Gastric.—A variable number of sympathetic fibers pass to the stomach from the plexus gulae with the vagus nerves. The majority of sympathetic nerves from the celiac ganglion are transmitted almost entirely via subsidiary periarterial plexuses investing or lying along arteries and the lesser curvature within the hepatogastric ligament. (As was noted by McRea, Teitelbaum and Jackson, it is macroscopically and microscopically impossible to distinguish between sympathetic and recurrent parasympathetic fibers in the gastric nerves emanating from the celiac plexus).

Periarterial Subsidiary Plexuses.—These consist of (1) the left inferior phrenic; (2) the left gastric (largest and most prominent—2 to 4 branches); (3) the hepatic (via the right gastric and gastroduodenal arteries and the hepatogastric nerves in the lesser omentum), and (4) the splenic (very few traceable).

Comment on Foregoing Data: In 18 dissections an estimated 85 per cent or more (in bulk) of the ascending sympathetic fibers from the celiac plexus and associated descending vagal branches of gastric nerves were observed within a 3 cm. radius of the left gastric, left inferior phrenic and gastroduodenal arteries. In only 2 cases were nerves of appreciable size observed to enter the stomach after traversing the avascular central area of the hepatogastric ligament. This is in keeping with the illustrated observations of McRea, Potts and Knight and with the brief descriptions in standard texts on anatomy (Cunningham; Gray; Morris).

To forestall possible postvagotomy gastroesophageal sympathetic dominance, simultaneous major "gastrosympathectomy" is suggested and in most instances, in view of the configuration of the gastric autonomic nerve fibers as herein described, is readily and effectively performed coincidentally with (1) ligation and partial excision of the left gastric and the left inferior phrenic arteries; (2) section and excision of nerves along the lesser curvature and transection of the gastrohepatic ligament, and (3) stripping and excision of nerves along the gastroduodenal and right gastric arteries.

In accordance with these anatomic observations, about 90 per cent of the gastric celiac plexus branches and consequently almost all of the sympathetic distribution to the stomach, the esophagus and possibly the uppermost portion of the intestine may be extirpated by these additional steps in a transabdominal approach to vagotomy. Moreover, the postulated recurrent vagal fibers to the stomach coming from the celiac plexus would be resected in this procedure. Since the probability of regeneration of autonomic nerve fibers exists, whether after vagotomy or after sympathectomy, we do not contend that permanent extirpation is hereby accomplished. All that is sought is a means of obviating immediate uncontrolled sympathetic overaction and dominance of gastrointestinal function until the adjustive automatic activities of the alimentary tract can come into play. It must be kept in mind, however, as demonstrated by the studies of Grimson, Ray, Womack and others, that pain perception from the gastrointestinal and biliary tract is diminished or abolished after ablation of the sympathetic afferent or viscerosensory fibers, and that patients must, accordingly, be kept under close clinical observation, since relief of ulcer pain under these conditions does not necessarily indicate healing.

GENERAL DISCUSSION

Section of the vagus nerves was first attempted a number of decades ago and was abandoned because of conflicting and unsatisfactory results. Similarly, gastric and esophageal sympathetic ablation of varying degrees, occasionally performed in combination with vagal section, have been reported by various authors in the past, with uncertain and disputed end results. However, review of the procedures previously recommended reveals that in the main they were partial and ineffective, just as the early vagotomies were largely incomplete. Thus, Schiassi incised the gastrohepatic omentum along the lesser curvature and circumferentially incised the gastric cardia in an attempt to denervate the autonomic supply of the stomach. His report indicated favorable results in the treatment of peptic ulcer in a small number of cases. Bircher did a somewhat similar surgical procedure, with equivocal results. Stierlin was another early user of an analagous method. Latarjet also attempted combined gastric neurectomy along similar lines. Ivy carried out a procedure of this nature on experimental animals. Pearl, in the treatment of tabetic gastric crises, advocated sectioning of the sympathetic nerves and, one would judge from the operation as described by him, cut the vagal nerve supply as well. Watanabe concluded that the results of splanchnicectomy in combination with vagotomy were at best equivocal. Moreover, it should be noted that Froelich reported favorable results in the treatment of peptic ulcer by sympathectomizing the stomach through splanchnicectomy and partial celiac ganglionectomy, resorting to the direct converse of the so-called vagotomy. It might be noted in passing that, along the lines suggested by Womack, the combined vagosympathectomy as defined by us might be adapted for the treatment of biliary dyskinesia by extirpating the pericholedochal, the hepatic periarterial and the gastrohepatic interligamen-

tous vagal and sympathetic nerve branches without resorting to resection of the celiac ganglion in its entirety.

With the present vogue of thoracolumbar sympathectomy as a surgical amelioration of hypertension and the recrudescence of vagotomy in the therapy of peptic ulcer (since the two diseases are common and not infrequently coexist), a few patients have been subjected to both splanchnicectomy and vagotomy. In some instances, which at present are enjoying the status of interesting surgical rarities, it appears that both clinical conditions have in some measure improved, although accurate evaluation of the end results in a significant number of such cases will not be available for a number of years. Harkins, moreover, has reported recurrent ulceration after vagotomy coupled with sympathectomy for hypertension.

A possible tendency toward aggravation of preexisting ulcers in hypertensive persons undergoing sympathectomy has been discussed by a number of surgeons in the recent literature. Dragstedt and Wangensteen have both stated that in such instances of unopposed vagal dominance peptic ulcers may undergo exacerbation. The danger of painless perforation in ulcers in which the visceral afferent pathways have been interrupted by sympathectomy is stressed by Dragstedt, Small, and Mandl, among others. Blegen, Weeks, and Priestley have reported untoward complications of this nature. However, since the somatic as well as the visceral sensory pathways of the parietal peritoneum and the anterior abdominal wall are irritatively stimulated in most gastrointestinal perforations, when a limited gastric sympathovagotomy is performed this consideration should not apply equally; for any disruption of viscerosensory mechanisms has been localized as compared to that following thoracolumbar sympathectomy.

The precise value of gastric neurectomy or vagotomy as yet remains to be established. Certainly, just as it proved too early to condemn and abandon vagotomy as a therapeutic procedure for ulcers because of its limited and incomplete application of yesteryear, so clinical reasoning would seem to justify further trials of thoroughgoing gastric vagosympathectomy. For several years at least it will probably be best to consider it a presumptively useful surgical treatment in selected cases, though still in the investigative phase. This study has been presented for comparison of the procedure with vagotomy alone and vagotomy performed in conjunction with gastroenterostomy when indicated. This excludes from evaluation subtotal gastrectomy and vagotomy, which, when performed together by the standard technics, produce in effect the equivalent of a true total gastric neurectomy by virtue of the sacrifice of the right and left gastric arteries and section of a great part of the gastrohepatic ligament.

The authors have to date, over an eighteen month period, performed gastric vagosympathectomy with gastroenterostomy as outlined above in 6 cases of medically intractable duodenal peptic ulcer associated with markedly hyperacid hypersecretion. Although this series is too small to be conclusive, relief of symptoms with relatively little postoperative gaseous distention or abdominal fulness and discomfort ensued. All patients left the hospital within two weeks after the operation, without significant complications. On this admittedly limited basis it is felt that further trial of the procedure is warranted. In accordance with the recent work of Meyer, (1948) who demonstrated a postvagectomy decrease in lysozome titers in cases of peptic ulcer, postoperative lysozome studies were made by a viscosimetric method of assay, in 4 of our cases. The preliminary indications are that lysozome concentrations are relatively low for at least three months after operation. We hope to amplify these studies in a subsequent paper.

SUMMARY

The gastroesophageal vagal and sympathetic innervation is described as observed in a series of 32 regional dissections. The literature is reviewed with reference to the incidence of postoperative distention and atony following vagectomy as usually performed. A correlation of such complications with the resultant unopposed sympathetic dominance of gastrointestinal function is presented. A rationale and technic of transabdominal gastric vagosympathectomy to forestall postvagotomy sympathetic overaction are given, based on the generally prevalent periarterial configuration of the gastric sympathetic nerves branching from

the celiac plexus and coursing in the gastrohepatic omentum.

RÉSUMÉ

L'innervation du vague gastro-œsophagien et l'innervation sympathique sont décrits tels qu'ils se présentent dans une série de 33 dissections régionales. Les articles, traitant cette question, sont considérés en tenant compte de la possibilité d'une distension post-opératoire et de l'atonie qui suit la vagotomie lorsqu'elle est réalisée comme on a l'habitude de le faire. On présente la corrélation qui existe entre de telles complications et la dominance fonctionnelle non opposée au sympathique gastro-intestinal. On donne une analyse et la technique de la vagosympathectomie gastrique trans-abdominale pour éviter un hyperfonctionnement du sympathique après la vagotomie basée sur la configuration périartérielle habituellement rencontrée des nerfs sympathiques gastriques issus du plexus cœliaque et se répandant dans l'épiploon gastro-hépatique.

RESUMEN

Se presenta una serie de 33 disecciones regionales con motivo de las cuales se estudia la inervación vagal y simpática gastroesofágica, pasándose revista a la literatura médica en relación a la frecuencia a la distensión postoperatoria y atonía, a continuación de la vagectomía, analizándose la correlación de dichas complicaciones que son resultantes del dominio simpático en la función gastrointestinal. Se expone los fundamentos y técnicas de la vagosimpatectomía gástrica transabdominal para contrarrestar la hiperacción simpática postvagotónica basada en la configuración periarterial prevalente, por lo general, de los nervios simpáticos gástricos que nacen del plexo celíaco y se ramifican en el epiplón gastrohepático.

RIASSUNTO

Descrive l'innervazione vagale e simpatica dello stomaco e dell'esofago in base ad una serie di 33 dissezioni anatomiche. Passa in rassegna la letteratura in riguardo alla frequensa della distensione e dell'atonia che conseguono alla solita vagotomia. Riferisce queste complicazioni postoperatorie alla perdita di ogni inibizione al simpatico gastro-intestinale. Propone una nuova tecnica di vago-simpatectomia gastrica transaddominale, che si basa sopra la prevalenza delle fibre simpatiche periarteriose che si irradiano dal plesso celiaco e che si dirigono nell'omento gastro-epatico.

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The International College of Surgeons

announces extension of the deadline for the

Hippocrates Essay Contest
to May 1, 1950

In appreciation of the fine response to date, the Contest Committee has voted to prolong the period during which submissions will be received. The title of the essay is "The Meaning of Hippocrates in the Medical World of Today"; the award, a $100 Government bond. There is no restriction as to eligibility or as to the length of the essay. Dr. Skevos Zervos, noted Greek physician and authority on the life of Hippocrates, heads the judges' committee. All manuscripts should be addressed to

Hippocrates Essay Contest
1516 Lake Shore Drive, Chicago 10

and must be postmarked not later than May 1, 1950.
The winning essay will be published in the *Journal*.

Gastroscopy in Surgery

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IN THE last three years, 410 gastroscopic studies have been done on patients in whom various disturbances of the gastroduodenal tract seemed to indicate surgical intervention. Since in the majority of cases endoscopic examination was done shortly before operation, it was possible to gather a few observations worthy of recording.

The usual technic was employed in every case. The patient was placed on his left side after administration of a local anesthetic. (Ten per cent cocaine hydrochloride was used at first, but in the last 100 cases we used 1 per cent pharmocaine, which produced better results. In only 10 cases was an injection of morphine given to diminish general sensibility. As the inconveniences produced by this substance are far greater than its advantages, its use was abandoned.) Our former conviction remained that in certain cases this gastroscopic method can be used to great advantage in diagnosis; it agrees perfectly with the results of roentgen examination. The indications for gastroscopic examination vary naturally, according to the lesion in the particular case.

GASTRODUODENAL ULCER

To be able to confirm, more or less decidedly, the result of roentgen examination for gastric ulcer, one must determine the site of the lesion, its width, its depth, the state of its margins and the condition of the surrounding mucosa. Gastroscopic examination will also reveal the condition of the membrane around the lesion, and above all the kind and extent of any gastritis that may accompany the ulcerative process. This last is the basic point, because in most cases it is roentgen examination that must determine whether the ulcer exists and, if so, where. Gastroscopic examination should define, with the greatest possible detail, the condition of the mucosa.

From the Division of Surgery (Prof. Luigi di Natale, Director) Ospedale Fatebenefratelli-Fatebenesorelli Ciceri-Agnesi, Milan.

In the presence of duodenal ulcer duly recognized by roentgen examination one must search with the endoscope for the possible coexistence of gastric ulcer. The hyperkinesis caused by the duodenal ulcer can, in certain cases, cause the gastric recess to be hidden from the roentgen rays, the passage of barium being obstructed by disordered movements of the muscles. Besides, when gastric ulcer is present, endoscopic examination will define exactly the state of the mucosa. Whether resection or gastroenteroanastomosis is performed depends on whether the gastritis is hypertrophic, erosive or atrophic.

If it is true that in the last few years the majority of surgeons all over the world choose to perform an ample resection as for duodenal ulcer, restricing gastroenteroanastomosis to special well defined cases or cases in which resection is technically difficult, it is also true that the surgeon who is mindful of his patient's future will be more sure of himself if he makes the resection as ample as possible. This is true if the gastroscope indicates a stomach affected by serious hypertrophic or erosive gastritis; it is still more apposite if the test meal leads to the same conclusion as does the endoscope (hypertrophic gastritis can, in special cases, be a cause of gastric hyposecretion). Resection will doubtless cause postoperative inconvenience in cases of atrophic gastritis, a rare condition indeed and difficult to demonstrate by the usual means of research.

If the surgeon finds the operation technically difficult, he will undertake it more confidently if the two examinations aforementioned have given him assurance that the patient has, coexistent with the ulcer, serious hypertrophic, hypersecretive or erosive gastritis. Otherwise, if the diagnosis has been made of atrophic gastritis or if the mucosa in appearance and function is almost normal, the surgeon will do, in the first case, a gastroenteroanastomosis according to his choice; in the second case it will be a necessity.

Conclusion: When gastroduodenal ulcer is present, roentgen examination in most cases will establish the diagnosis. Endoscopic examination after a test meal will indicate which is the best surgical technic to adopt.

GASTRIC NEOPLASMS

Several problems must be taken into consideration. Roentgen examination reveals the neoplasm; the endoscope confirms it; it remains for the surgeon to specify the type. One may assume that about one-half of all gastric neoplasms will reveal, gastroscopically, a stenotic form. This may be due to its productive or retractive character; spasm (even though this is of little importance); insufflation; or resistance to the point of the gastroscope, which, properly handled, can be overcome. Although the stenotic form indicates that a generic diagnosis can be made of the neoplasm, it is impossible to define its type and its extent toward the base. The upper limit is revealed by the stenotic ring.

In the presence of the nonstenotic form the endoscope will determine whether the growth is of the nodular productive type, the productive ulcerated type, the ulcerated type, the cirrhotic type or a type resulting from various combinations. In the ulcerated forms the behavior of a neoplasm situated on the lesser curvature is usually different from that of a neoplasm on the greater curvature or mainly on the walls (as in the case of simple ulcer). The rigidity of the walls of the lesser curvature and the greater firmness of the submucosa at that level do not permit displacement of the mucosa over and around the lesion.

It is of the greatest interest to the surgeon to define exactly the highest limit of the tumor, so that he may know whether there exists enough material for an anastomosis. This is important, since the asportation of the stomach is a technic that is still not entirely systematized.

When the results of roentgen examination and gastroscopic examination were compared, it was noted that roentgen study showed the existence of a lesion not detectable by the endoscope. One must bear in mind that lesions situated on the lesser curvature, from the angulus to the pylorus, or in the immediate subcardial area, present difficulties, since technical vision is much obstructed; first, by the contour of the lesser gastric curvature with the angulus; second, by the closeness of the walls to the reflecting prism. This is true of all lesions, no matter what the type.

If conclusions regarding the gastric walls and the lesser curvature from the angulus to the immediate subcardial region are confirmed

Fig. 1.—*Left,* hypertrophic ulcerative gastritis. *Right,* gastric ulcer of the lesser curvature.

Fig. 2.—*Left*, stenotic carcinoma at the angulus. *Right*, stenotic carcinoma of the gastric body.

by endoscopic but not by roentgen examination, the latter must be repeated, and this time it should be directed toward exact location of the neoplasm. This is difficult, but it is necessary for full observation of the lesion.

Collaboration should be emphasized, for it brings immense returns in the diagnosis of neoplastic disease. It becomes absolutely necessary if one wishes to obtain an early diagnosis of any of the various forms of gastric carcinoma (especially prior to its invasion of the ganglions), thus enabling the surgeon to perform a really radical gastroectomy.

The flexible gastroscope raised many hopes when it was discovered in 1932, but these hopes were soon dispelled by repeated failures. At the same time, many valorous roentgenologists were laying the foundation for an exact diagnosis of early neoplasms. Finally, a step in the right direction was taken with the introduction of the pharmaceutical test meal. This makes use of the retractable sclerosis of the muscularis mucosa and submucosa, which show, even in the early stages, convergence of the plicas and a certain rigidity. These signs, however, are not always pathognomonic. Gastroscopic examination is therefore highly desirable, for it enables one to settle any doubts without waiting for the results of roentgen examination, which as a rule is delayed to some extent and causes delay in intervention. In the case of a slowly developing neoplasm, several months would be necessary to verify the alteration by roentgenogram; but if the growth is rapid, a fortnight's delay may be fatal. It is known, for example, that in that special form of muco-erosive carcinoma, according to Gutman, roentgen examination results in a picture very difficult to interpret. Gastroscopic study, on the other hand, provides a positive diagnosis, as I have personally observed in a recent typical case.

POSTOPERATIVE EFFECTS

In the last twenty years the number of persons who have undergone operations on the stomach has gradually increased. Some patients, discharged as surgically cured after a certain period, complain of a variety of symptoms. All surgeons know the extreme difficulty of an exact diagnosis of pain following gastrectomy, since the test meal examination does not give an answer beyond the possibility of doubt. Roentgen examination also, for various reasons, encounters obstacles undifferentiated by a barium meal at the level of the lesser curvature of the stomach and the jejunal loop.

It is obvious, then, that endoscopic examination is important. It must indicate primarily whether there is gastritis, to which type it belongs, and to what extent it is present—whether it is limited to the anastomotic cavity

Fig. 3.—*Left,* ulcerative carcinoma of the angulus. *Right,* productive carcinoma of the gastric body.

or extends throughout the remaining portion of the stomach and the jejunum. Judging from the patients I have examined, the results indicate that it is not correct to attribute a process of doubtful chronic gastritis to disturbances observed in a patient who has been operated upon. I have been able to prove that gastritis does not develop from gastrectomy unless it was present before the operation. However, when, instead, the endoscope and macro-microscopic examinations had previously demonstrated hypertrophic gastritis, after a certain postoperative period I noticed either the continuation of the lesion, its disappearance or its transformation to an atrophic form.

After gastroenteroanastomosis hypertrophic gastritis is more frequent, apparently depending on the site and conformation of the anastomotic cavity. As yet I have had no direct experience in the endoscopic identification of peptic ulcer.

In one-fifth of my reexamined patients (three to eighteen months after operation) I have noted some catgut not absorbed at the level of the stomach. The catgut was either two stitches at the left angle of the stomach or a long stitch pulled for some distance by the posterior suture. Later I observed this on the anterior side, since it was placed there by the continuous extramucosal method. These threads cause chiefly a stomatitis of noticeable degree, with various disturbances that affect the general health. Some surgeons intercede by means of gastrotomy and the removal, in cases of stomatitis caused by silk, of the silk threads involved, which naturally clears up the postoperative symptoms.

In the case of catgut, intervention is not suitable, since catgut is not so likely to fester as is silk. The addition of hydrochloric acid to the patient's food will dissolve the catgut which the organism was unable to absorb.

It is not inopportune to note that only the endoscope is capable of indicating the presence of nonabsorbed threads. Only endoscopic examination can reveal, eventually, the cause of the various postoperative disturbances that affect some patients in this field of surgery.

In patients who complained of the characteristic symptom known as "dumping stomach," I discovered an anastomotic cavity with highly developed edema. I do not know what relation there is between this local manisfestation and the subjective and objective phenomena observed in the patient. Is the edena a gastric manifestation of general hypoproteinemia, or is the latter limited to the gastric lesion? It is certain that intense localized edema in the anastomotic cavity makes the passage of food through the gastric parts of the jejunal loop more difficult.

Less plausible is the hypothesis offered by

some to explain the "dumping syndrome"—namely, that the symptom is referable to a precipitous emptying of the stomach, with abnormal distention of the jejunal loop or with hypoglycemic effects following an exaggerated discharge of insulin (thus taking into account both the "dumping syndrome" and the postprandial hypoglycemia). The problem deserves more thorough discussion, but the endoscopic report is absolutely necessary for an answer.

Some patients complain of postoperative pains, but the causative factors are not referable to the stomach. It is entirely possible that they are due to the formation of stones in the gallbladder. Since roentgen examination cannot discover their presence, one is limited in most diagnostic procedures to excluding cholecystitis; also, the cholecystographic picture in a patient who has undergone resection depends strongly on the presence of stones in the gallbladder. However, even in such cases gastroscopic examination excludes, with certainty, all lesions arising from the gastric stump and the anastomosis, thus drawing attention to cholecystitis as the real cause of the patient's complaint.

SUMMARY

This study sets forth the conclusions drawn from 410 gastroscopic examinations of patients with gastroduodenal lesions who underwent surgical treatment shortly afterward.

The surgical purposes of endoscopic examination of gastroduodenal ulcer are stressed. This method provides the surgeon with a better idea as to the kind of surgical intervention that is most likely to ensure the best postoperative results. The study should be aimed at ascertaining, first of all, what type of gastritis is responsible for the lesions.

In cases of suspected neoplastic disease, gastroscopic examination often enables one to avoid a useless laparotomy. However, in the case of a gastric neoplasm already present, close cooperation between the roentgenologist and the surgeon will be profitable when the lesion is still in the initial stage.

A study is made of some of the causes accounting for the troubles which usually affect the patient submitted to an operation on the stomach. Emphasis is laid on the contribution of endoscopic examination toward solving a number of problems. Postoperative gastritis, nonabsorbed threads, "dumping stomach," postprandial hypoglycemia and postresection cholelithiasis may be discovered or verified by this means.

RIASSUNTO

Vengono esposte le conclusioni tratte da 410 gastroscopie eseguite su pazienti che, affetti da lesioni gastroduodenali, subirono un intervento chirurgico a breve distanza dall'esame stesso.

Fig. 4.—*Left,* scirrhus. *Right,* catgut thread in a resected stomach.

Si prospettano le finalità chirurgiche che deve perseguire un esame endoscopico nelle ulcere gastroduodenali, ravvisando nei processi di gastrite, concomitanti la soluzione di continuo, la ragione prima di tale esame, la risposta endoscopica indirizzando il chirurgo verso quel tipo di intervento che assicurerà un miglior decorso postoperatorio.

Si prostetta poi la possibilità gastroscopica di evitare inutili laparatomie nelle neoplasie gastriche già sviluppate, propugnandosi per le forme all'inizio una stretta collaborazione col radiologo.

Vengono infine considerate alcune cause dei disturbi che affliggono gli operati di stomaco, ponendo in evidenza quale é l'apporto che l'endoscopia può dare alla soluzione di problemi che sono tutt'ora allo studio (gastrite postoperatoria=fili non riassorbiti=dumping stomach=ipoglicemia postprandiale=colelitiasi dopo resezione).

RÉSUMÉ

On expose les conclusions tirées de 410 gastroscopies effectuées sur des patients qui, souffrant de lésions gastro-duodénales, avaient subi une intervention chirurgicale peu de temps après l'examen-même.

On parle ensuite des buts chirurgicaux que doit poursuivre une examen endoscopique des ulcères gastro-duodénaux, et on affirme que les processus de gastrites concomitantes la solution de continuité, devraient etre considerés l'objet principal de l'examen susdit, la réponse endoscopique étant celle qui orientera le chirurgien vers le type d'intervention qui aura les meilleures suites post-opératoires.

On parle encore de la possibilité offerte par la gastroscopie d'éviter des laparotomies inutiles dans les néoplasies gastriques déjà développées et préconise, au commencement, une collaboration étroite avec le radiologue.

On considère enfin quelques-unes des causes des dérangements dont souffrent les opérés de l'estomac, en mettant en évidence la contribution de l'endoscopie dans la solution des problèmes encore à l'étude (gastrite post-opératoire—fils non ré-absorbés—dumping stomach—hypoglycémie—postprandiale—cholélithiase après résection).

RESUMEN

Se exponen las conclusiones sacadas de 410 gastrocopias ejecutadas sobre pacientes que, afectados por lesiones gastro-duodenales, han sido sometidos a intervención quirurjica poco tiempo después de este examen.

Se exponen las finalidades quirurjicas que debe alcanzar un examen endoscopico en las ulceras gastroduodenales, considerando en los procesos de gastritis concomitantes la solución de continuidad, y la razón primordial de tal examen, la contestación endoscopica que haya de aconsejar al cirujano hacia aquel tipo de intervención que pueda asegurar un mejor decurso postoperatorio.

Se exponen además la posibilidad gastroscopica de evitar inutiles laparatomias en las neoplasias gastricas ya desarolladas, recomendandose para las formas al inicio una estrecha colaboración con el radiologo. Se consideran también algunas causas de las molestias que aflijen los operados del estomago, poniendo en evidencia cual es el contributo que la endoscopia puede dar para la solución de problemas que están todavia estudiandose (gastritis postoperatoria=hilos no reabsorbidos=dumping stomach=Hipoglicemia post -comidas=calculos de la vesicula de la hiel después de la gastrectomia.

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Pilonidal Cyst:

Treatment by a Uniformly Successful Method

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UNFORTUNATELY, numerous so-called recurrences have led to the belief that treatment of a pilonidal cyst by removal is frequently ineffective. Since surgical cure of this disease often has been wanting, treatment by electrodesiccation, actual cautery and chemicals has been employed in the hope that better results might be obtained.

If any doubt exists as to the wide incidence of this lesion, reference should be made to the literature on the subject (Masson;[1] Hayter;[2] Dulligan;[3] Wharton;[4] Newell;[5] Horsley;[6] Owen;[7] Fansler and Anderson;[8] Saleeby and McCarty[9]). Some authors, from experiences during the recent war, gained the impression that active pilonidal cysts were especially prevalent among servicemen. Anderson,[10] who first described this interesting lesion, noted that the patient was a man, and Warren,[11] who reported cases in 1854, described the true nature of the cyst. Theis and Rusher[12] have given an excellent account of its historical background, and the embryologic aspects have been discussed adequately many times (Hodges;[13] Courad;[14] Tourneau and Herrmann;[15] Mallory;[16] Aschoff;[17] Pauthiou;[18] Stone;[19] Weinstein;[20] Thomason;[21] Smiley;[22] Gage;[23] Fox;[24] Kallet;[25] Zieman[26]). Essentially, a pilonidal cyst is an embryologic rest of ectodermal origin, usually occurring in the portion of the neurectoderm last to be detached from the skin.

Although it is generally agreed (Breidenbach and Wilson[27]) that trauma does not play a role in the production of pilonidal cyst, trauma is an important factor in the production of inflammation and clinical symptoms (Goodsall and Miles;[28] Jones;[29] Cupp[30]). In this regard it should be noted that pilonidal cysts, although they occur nearly always in the sacrococcygeal region, may also occur higher along the spine (Stoner;[31] Smith;[32] Sharpe;[33] Walker;[34] Hamby;[35] Boldrey and Elvidge[36]).

TREATMENT

Sclerotherapy (Crookall;[37] Maillard;[38] Cutler and Zollinger;[39] Block and Greene;[40] Biegeleisen[41]) and irradiation (Smith;[42] Turell[43]) have been suggested. In general, two surgical methods of treatment are available: (*a*) block excision and open packing (Beck;[44] Bookman;[45] Anderson;[46] Rogers;[47] Rogers and Hall;[48] Rogers and Dwight;[49] Warman;[50] Silverman;[51] Kallet;[52] Pickett and Beatty[53]) and (*b*) excision of the cyst and some type of closure (Camp and Polites;[54] Ottenheimer;[55] Dunphy;[56] Larkin;[57] Cattell and Stoller;[58] Gage;[59] Morter;[60] Burgess;[61] Tendler;[62] White[63]).

Rogers,[64] in 1933, observed that whether cysts were treated by excision and open packing or by some method of primary closure the average healing time was about two and eight-tenths months, while Woldenberg and Sharpe[65] stated that, in 72 per cent of all cases in which primary closure was employed, healing was complete in fourteen days. A similar figure, with 92 per cent of cures, was reported by Ferguson and Mecray.[66] Kleckner's[67] review of 4,699 cases, in which one third of all cysts treated by primary closure recurred, contrasts with the excellent results from this method reported by Gage[68] and McKirdie.[69] The general recurrence rate of 25 to 30 per cent (Weeder;[70] Kooistra[71]) appears to be an accepted misfortune.

Excision and primary closure, besides involving the possibility of wound breakdown and infection, obliterates the normal internatal cleft. Wounds closed in this manner frequently tear open owing to the absence of an internatal groove, which normally becomes shallow on sitting (Brezin, Love and Lawrence[72]); therefore, various methods of overcoming tension on the lateral flaps have been suggested

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(Lahey;[73] Cattell;[74] Swinton and Hodge;[75] Shute, Smith, Levine and Burch[76]).

Buie,[77] a surgeon of unusual experience, has obtained good results by a type of marsupialization procedure after incision of the cyst and its sinuses and removal of the overhanging edges, a method similar to that suggested later by Goldbacher.[78]

The long period required for epithelium to replace the granulation tissue of the cyst bed is shortened by the method suggested by Colp[79] and modified by MacFee[80] and Van Alstyne.[81] With this technic a block excision of the area is performed, followed by suture of the skin flaps to the deep fascia, leaving an interval of perhaps 1 cm. for epithelial replacement.

The impression could not be avoided, however, that the Colp-MacFee-Van Alstyne method unnecessarily removed normal skin and thereby increased the time required for development of epithelium over the defect. The time is proportionate to the diameter of the ellipse removed. Therefore, in each of 315 patients, many of whom had been operated on previously, frequently several times by the open and closed methods, I carried out a simple excision under spinal or intravenous anesthesia. Without preliminary staining, an incision is made from the external opening of each sinus to the central cyst, the procedure to this point being identical with the initial step in Buie's method. Whether the picture at this juncture is a single incision (in the case of a series of midline sinus openings), or a cruciate or stellate incision (if lateral sinus openings are present), the bed of the incision consists of granulation tissue.

Without the removal of any skin, the opened cyst and its communicating tracts are cut out. Hemostats are applied to any vigorous bleeding points, and the entire fatty or fibrous bed, corresponding in shape to the original incisions (i.e., the general shape of the cyst and its ramifications) firmly packed for hemostasis with gauze moistened in warm solution of sodium chloride for five minutes. As Holman[82] has said, patience and pressure may supplant the use of ligatures. In none of my cases has a bleeding vessel required ligation, any hemostats being removed gently before closure. Although Meleney[83] and Scott[84] have encouraged the use of sulfonamides in pilonidal cystectomy wounds, I have not employed oral, parenteral or local chemotherapy.

No buried sutures being present, I then carry out a modified Colp-MacFee-Van Alstyne type of closure, suturing only the skin edges of each side to the sacrococcygeal fascia in the midline region of the cyst bed (or to the gluteal fascia in the case of lateral ramifications), using interrupted fine silk or cotton sutures placed about 1 cm. apart. The sutures are so placed that, when they are tied, the edges of the skin in the midline cleft and in the adjacent clefts formed by the lateral beds are approximated. The tying is postponed until all sutures have been placed. When the operation is complete, a stellate closure is apparent if a stellate lesion was present, the suture lines being a pattern of the original cyst and its ramifications. The normal internatal cleft in the region of the main cyst is preserved, and minor clefts, of course, are present where adjacent sinuses were present. Dry gauze dressings are placed lightly in the clefts, and a protective, fairly thick gauze dressing is applied and held in place with sufficient adhesive tape, no attempt being made to approximate the buttocks.

This method, by which the normal internatal cleft is preserved, offers potential avenues of egress for infected exudate from under the skin flaps. Patients are permitted to walk, sit and go about their normal duties on the day of operation. The wound is dressed on the third or fourth day in a manner similar to that used for the first dressing. Sutures are removed as they appear to require removal; a few may be taken out on the fourth or fifth day, while some may be retained for eight or ten days. By preserving all skin, tension on the suture lines is avoided and separation of skin flaps from the deep fascia does not occur.

To avert development of an infected cyst-like area where skin flaps approximate each other in especially hairy persons, roentgen depilation about ten or twelve days after operation has been employed in several cases. With this method, complete healing has taken place within two weeks in every case. There has not been any recurrence in this series, some of the cases having been reviewed as long as six years after operation.

SUMMARY

A method of treatment of pilonidal cyst by accurate excision of the cyst and its ramifications, without sacrifice of skin, with preservation of normal internatal contour, and permitting discharge of the patient from the hospital to normal duties on the day of operation, is described. The method is not new, but is presented because of its success, without exception, in 315 cases of pilonidal cyst, in many of which the patients had undergone one or more previous operations.

RÉSUMÉ

On décrit une méthode de traitement du kyste dermoïde par une excision soignée du kyste et de ses ramifications sans sacrifier la peau en conservant l'aspect extérieur normal et en permettant au malade de retourner à ses occupations le jour même de l'opération, sans séjourner à l'hôpital. La méthode n'est pas nouvelle, mais on la présente en raison de ses succès ininterrompus dans 315 cas de kyste dermoïde. Dans plusieurs de ces cas, les malades avaient déjà subi auparavant d'autres opérations pour cette même lésion.

RESUMEN

Describe el autor un método para el tratamiento del quiste pilonidal mediante la extirpación completa del quiste y sus ramificaciones sin sacrificar la piel, conservando el contorno normal, y permitiendo que el paciente sea dado de baja del hospital y retorne a su vida cotidiana el mismo día de la intervención. El método no es nuevo, presentándolo el autor por el éxito, sin excepciones, que con él ha tenido en 315 casos de quistes pilonidales, en muchos de los cuales los pacientes habían sufrido previamente una o más intervenciones.

RIASSUNTO

Descrive un metodo operatorio che consente un'escisione accurata delle cisti pilonidali e delle loro ramificazioni senza sacrificare la cute e i contorni dell natiche, permettendo in tal modo ai pazienti di lasciare l'ospedale il giorno stesso dell'operazione. Questo metodo non e' nuovo; ma e' riportato in esteso, perche' ha condotto in 315 casi (molti dei quali precedentemente operati) ad un completo successo.

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A New and Improved Anoscope

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TO the dictum "Practice makes perfect" might be added a corollary; namely, that practice aided by the active intelligence gravitates toward perfection. Whatever practical knowledge and skill one would normally acquire over a quarter of a century of exclusive practice of proctology has been translated into the new and improved anoscope described here.

This instrument, the "Anuscope" (see illustration) is designed to render possible a painless, easy examination of the anus and rectum. This is accomplished by a smoothly rounded and gently dilating tip. The anoscope is furnished with a cheap source of illumination, an ordinary fountain pen light battery. This is used as a battery handle, and the lamp used may be turned on as with a pen light. The lamp used is a standard cystoscope lamp, and by it the field is abundantly lighted. The obturator is furnished with a thumb ring which permits the thumb of the examining hand to hold the obturator after withdrawal and to replace it immediately if necessary.

The cost of the instrument has been greatly reduced by simplification of the parts. Batteries for the handle can be obtained at any five and ten cent store, since they are ordinary pen light batteries.

In the hands of my colleagues and myself, the instrument has proven to be exceptionally well designed for its double purpose:

1. It makes possible an easy, painless examination of the anus and the lower part of the rectum.

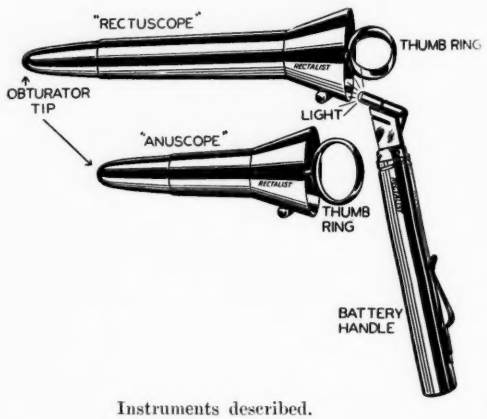
2. It is especially well adapted for the injection treatment of hemorrhoids. As the instrument and the illumination are all controlled with one hand, the other hand is thus left free to be employed in the actual injection of hemorrhoids or treatment of the parts under observation.

A longer rectoscope designed along the same lines is available for examination for the upper rectum. It fits the same battery handle as does the anoscope.

RÉSUMÉ

L'auteur présente un nouvel instrument "l'Anuscope" de Montague (voir l'illustration), désigné pour que le proctologiste puisse faire un examen facile et sans douleur de l'anus et du rectum. "L'Anuscope" fonctionne avec une légère batterie de stylo lumineux ordinaire, qui n'entraine pas de frais importants.

L'auteur considère que son instrument est particulièrement bien adapté pour l'injection employée dans le traitement des hémorroïdes. On peut aussi avoir un instrument plus long, le "Rectuscope" dont on se sert pour examiner la partie supérieure du rectum. Les deux in-



Instruments described.

struments fonctionnent avec le même manche contenant la batterie.

RESUMEN

El autor presenta un nuevo instrumento, el "anoscopio" de Montague (véase la ilustración), diseñado para permitir al proctólogo hacer un examen fácil e indoloro del ano y del recto. El anoscopio funciona con una pequeña batería eléctrica del tamaño de una pluma estilográfica, y por lo tanto, el costo de su manejo es relativamente económico.

El autor considera que su instrumento está especialmente adaptado para el tratamiento por inyecciones de las hemorroides. Puede también utilizarse otro instrumento más largo, el "rectoscopio," para examinar la parte superior del recto, pudiendo ensamblarse ambos instrumentos al mismo mango que contiene la batería citada.

RIASSUNTO

Presenta un nuovo strumento, il cosìdetto Anuscopio (vedi fig.), che consente al prottologo di esaminare in modo facile e non doloroso l'ano ed il retto. L'anuscopio funziona con una piccola batteria tascabile, di modo che il suo uso non e' costoso.

L'A. ritiene che lo strumento sia particolarmente indicato per la cura delle iniezioni sclerosanti delle emorroidi. Uno strumento piu' lungo, il rettoscopio, serve per l'esame delle parti alte del retto: e' inserible sullo stesso manico che contiene la batteria.

LA PRESSE MEDICALE

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Editorials

The Enigma of Destiny

Every so often, in the writings of our professional colleagues, there crops up a heartening bit of evidence that doctors are still concerned with the larger issues of life and philosophy as well as with the minutiae of scientific knowledge. Such a bit of evidence is to be found in a small brochure written by Dr. Vincent A. Lapenta, which, although not a new publication*, contains much food for thought and many points of departure for further speculation. Subtitled "Philosophic Musings of a Surgeon-Chemist," the essay undertakes to set forth the author's reasons for being convinced that there is more in the phenomenon of life than meets the eye, even the penetrating eye of the microscope.

The premise is stated without equivocation. "If science is not to prove a false matter, it must deal in the final analysis with metaphysics and philosophy." The argument that follows is interesting as an exercise in logic and no less interesting for its scientific tone. Deeply interested in chemistry and its potentialities, Dr. Lapenta points out that to this science materialists have always turned for their chief ammunition, as witness the triumph they displayed when Wohler made his important discovery that urea, an organic compound, could be synthesized from ammonium cyanate. The author takes exception to this triumph, believing it to have no basis whatever. "Even if it were true that life originated by chance from the inorganic world, the origin of matter would still need to be explained. . . . These negative propositions involve metaphysical assertions requiring greater will to believe than is required by any philosophical concept postulating a creation and a creator." Chemical discoveries thus far assert, rather than deny, the existence of a supreme force still undefined, which may as well be called God as anything else. The essay concludes with a memorable quotation from Slosson:

> Continuously, in an out, over and under, circle the elements; never at rest, never the same, all bent on the mission appointed them before the creation of the world Never faltering, never deviating, each atom follows the path through empty space marked out for it millions of years ago; a path so complex that no mathematics can calculate it for the thousandth part of a second, yet so regular that no variation can be detected in years. Back and forth without stopping moves the shuttle of matter, eternally weaving the living garment of God.

Since the "whence" of life has yet to be discovered, the "whither" must also remain entirely in question. It is good, perhaps, on the whole, that we do not know. Ignorance, in an intelligent mind, is a dynamic creative force. Out of it, and the overwhelming thirst to overcome it, have emerged all the great discoveries of the ages. Even if the question of the origin and ultimate destiny of all life must remain forever unanswered, the quest for the answer is like the search for the Grail; it informs all life with meaning, vitality and purpose.

Whatever the issue, if ever an issue is known, it is a sad mistake to call cogitation a waste of time. A quest that fails in one direction may succeed in a dozen others; this is the common experience of all who have achieved. The cry for "More light! More light!" may never bring us to the full noon of realization, but it can keep our heads above the shadows and our feet on a surer path. When men of learning and skill forget to think, the reservoir of ideas will soon run dry.

*The Metaphysics of the Ultimate Reality. By Vincent A. Lapenta. Reprinted from The Hexagon of Alpha Chi Sigma, vol. 19, No. 3, 1928.

Youth and Professional Integrity

THE International College of Surgeons, which from the beginning has conceived of itself as a teaching organization no less than a universal medium of communication and mutual aid among men of established accomplishment in the scientific world, has recently, by the creation of Junior Membership in its United States Chapter, flung the portals still wider to talent, brains and worthwhile achievement. This new rank of membership admits to our goodly company men whose powers have yet to be fully realized, and who naturally look to their seniors in the profession for guidance.

To this guidance we are committed by every decent and generous law of professional fellowship and humanity. There are few among us who cannot recall at least one "bright particular star" among our own early teachers and mentors, and what his recognition meant to us at the beginning of our careers. But we were lucky if we found one or two such guides. The mere press of work, together with the fact that comparatively few organizations then provided such opportunities, deprived more than one of us of associations that would have been a supreme source of inspiration, encouragement and wisdom.

Today, when we realize as never before how vitally important it is to have surgeons nurtured and trained according to the highest possible professional skills and standards, our obligation to the young men among us is plain. The United States Chapter, therefore, in setting up requirements for Junior Membership, has placed no barriers in the young surgeon's path. The requirements for this membership are minimal. The candidate must be a graduate of an approved school of medicine and must have completed a surgical training program consisting of a minimum of one year's approved internship and two or more years' approved residency. He must provide satisfactory evidence that he is ethically, professionally and morally qualified for Junior Membership in the International College of Surgeons. He will be elected as a Junior Member when his application has been approved by the Board of Examiners of the United States Chapter. Junior Members are expected to apply for Associated Membership within three years after their election to Junior Membership. Application for Associateship must be made to the Board of Examiners of the United States Chapter.

With these requirements, which place no strain upon either the purse or the personal life of any candidate, we hope and expect that many new faces will be seen at future Assemblies of the Chapter. To all young men who come we extend a hearty welcome and the assurance that to the best of our abilities we will share with them what we have learned. They are the heirs of our labors, and we have more than a casual interest in their inheritance.

New Horizons

By the Editor

A Vanishing Race

Professor Alexander Lipschutz of Santiago, Chile, who in 1946 led a scientific expedition to Tierra del Fuego to investigate the physical characteristics and cultural status of the Fuegian Indians,* reports this race as "on the way to complete cultural and biological extinction." He ascribes this decline chiefly to the influence of the Europeans who followed the Fuegian trail in Tierra del Fuego and who, although they fell heir to, and made use of, Fuegian culture in the development of the region, did not desire the survival of the Fuegians as a racial unit. Miscegenation with whites has greatly altered the Fuegians, of whom only a handful, so to speak, remain.

Basically, however, Dr. Lipschutz finds this ancient people, especially the Ona Indians, anthropologically similar to other American Indians, pointing out the persistence of Mongoloid Asiatic traits in both. This resemblance, of course, has long been accounted for by various theories of migration, advanced in the effort to answer a long-discussed question—that of the origin of human life in the Western Hemisphere. In the Americas no fossils are to be found that would indicate the existence here of primeval man; migration, therefore, would seem the logical explanation, though the manner and source of that migration is still a matter of argument.

According to Professor Lipschutz, the Fuegians are not only a vanishing but a greatly misunderstood race. Statements of Darwin and other investigators, he believes, have given rise to a general impression that these tribes are hardly human. On the contrary, Professor Lipschutz and his associates arrived at the conclusion that the Fuegians are "in no way different from other human beings in character or intelligence." This impression was confirmed by the civil and military authorities of Tierra del Fuego, as well as by the white farmers who are native to the region. "The social relations between the whites and the Fuegians are good, and are like those between different social strata in a racially homogeneous ethnos." Professor Lipschutz quotes Gusinde, an authority on Fuegian culture, to the effect that this race adapted itself admirably to its geographical surroundings and produced a native culture on as high a level as a difficult environment allowed.

The intrinsic interest of these observations is considerable, the philosophic and historical interest still greater. The appearance and slow extinction of any single race of mankind upon the earth has always a touch of mystery about it; it becomes, when viewed *sub specia aeternitatis*, another of those veiled mutations of destiny that perpetually alter and magnify life and its problems. The seeker after ultimate truth, no matter how hard he pursues it, is constantly brought up against the realization that many goals lie still beyond his reach. Where did the Fuegians come from in the first place? Nobody knows. Why, in the course of history, are they doomed? The answer is silence.

*Royal Anthropological Society: **Man 48**:7-8 (January) 1948.

Chapter News

Brazilian Chapter: The inauguration of the Brazilian Chapter of the International College of Surgeons was held on the evening of Sept. 30, 1949, in the auditorium of the Public Library in the city of São Paulo.

Prof. Dr. Pedro Calmon, Dean of the University of Brazil, Rio de Janeiro, presided. Among the others who were present and who participated in the ceremonies were the following:

Prof. Dr. Carlos Gama
Prof. Alvaro Guimarães, Filho
Dr. Sinesio Rangel Pestand
Dr. José Ayres Netto
Dr. José Avelino Chaves
Dr. Sebastião Hermento, Júnior
Dr. Pedro Ayres Netto
Dr. Manuel Marcondes Machado
Dr. Oscar Cintra Gordinho
Dr. Virgillio S. Carvalho Pinto
Dr. J. A. Saores Batista
Dr. Eurico Branco Ribeiro
Dr. Lucas Machado
Col. Vital Baz, Brazilian Army
Major Villa Longa, Brazilian Air Force

The meeting was opened by Dr. Calmon, who introduced Prof. Carlos Gama, President of the Brazilian Chapter of the International College of Surgeons. Prof. Gama gave a brief history of the College, and stated that the purpose of the organization is primarily to further the advance of the art and science of surgery throughout the world. He then read the Constitution and Bylaws of the Brazilian Chapter and pointed out that "this organization is founded to create a common bond among the surgeons of the world and to promote the highest standards in surgery throughout the world, without regard to race, creed or color."

Prof. Gama further stated that the College has been founded upon the principle set down by Louis Pasteur: "Science belongs to no nation, for knowledge is the patrimony of humanity, the torch which enlightens the world."

After the address by Prof. Gama, the members read, in unison, the Pledge of the College.

The diplomas were then conferred by Prof. Calmon. The following officers were installed:

Prof. Dr. Carlos Gama, President
Dr. J. Avelino Chaves, President-Elect
Dr. Sebastião Hermeto, Júnior, Vice-President
Dr. Virgilio Alves Carvalho Pinto, Secretary
Dr. José A. Soares Batista, Ass't. Secretary
Dr. Eurico Branco Ribeiro, Treasurer
Dr. Oscar Cintra Gordinho, Ass't. Treasurer

The following regents were installed:

Prof. Dr. Gustavo Gouvea, Rio de Janeiro
Dr. Fernando Luz, Filho, Salvador, Bahia
Dr. Luiz Tavares, Recife, Pernambuco
Prof. Dr. Guerra Blessamann, Porto Alegre
Prof. Lucas Machado, Belo Horizonte
Prof. Mario de Abreu, Curitiba, Paraná
Dr. Elipidio V. Cannabrava, Triangulo Mineiro, Minas
Dr. Josas Castro Prado, Londrina, Paraná
Dr. Manoel Marcondes Machado, Campina, São Paulo
Dr. Arthur Domingues Pinto, Santos, São Paulo
Dr. Tinoco Cabral-, Ribeirão Preto, São Paulo

Prof. Gama introduced Prof. Calmon, who addressed the assembly on the history of medicine and surgery. The meeting then adjourned to the Casa Anglo-Brasileira for dinner and a business meeting.

Italian Chapter: Plans for the Second Annual Assembly of the Italian Chapter, International College of Surgeons, to be held on May 27, 28 and 29, 1950, at Venice and Padua, are outlined by Prof. Dr. Antonio Bobbio, Secretary, as follows:

Saturday, May 27, morning:
- Travel from Venice to Padua by car
- Opening session in the Aula Magna of the University of Padua
- First Scientific Meeting
- Luncheon

Saturday, May 27, afternoon:
- Second Scientific Meeting, Surgical Clinic, University of Padua
- Tour of the city
- Return to Venice by car

Sunday, May 28, morning:
- Third Scientific Meeting, Civil Hospital, Venice
- Tour of the city

Sunday, May 28, afternoon:
- No meetings scheduled
- Banquet at Torcello in the evening

Monday, May 29, morning:
- Joint session of the Italo-Swiss Society of Medicine and Surgery and the Italian Chapter of the International College of Surgeons at the Palazzo Ducale, Venice

Monday, May 29, afternoon
- Fourth Scientific Meeting

Austrian Chapter: At a recent meeting of the Austrian Chapter of the International College of Surgeons, the following officers were elected for 1950:

President: Prof. Dr. Hans Finsterer, Professor of Surgery, University of Vienna

Vice-President: Prof. Dr. Tacilo Antoine, Head of the 2nd Gynecological Clinic, University of Vienna

Secretary: Prof. Dr. Felix Mandl, Head of the Surgical Department, Kaiser Franz Josef Spital, Vienna

Treasurer: Prof. Dr. R. Oppolzer, Head of the Department of Surgery, Vienna Policlinic

Finnish Chapter: The degree of Honorary Fellow was conferred on Prof. T. Kalima, Professor Emeritus in Surgery of the University of Helsinki, at the Chapter meeting held on Sept. 10, 1949, in Tampere. At the same meeting Prof. Viljo Tuomikoski lectured on "Virilismus Adreno-Genitalis" and Dr. Eero Turpeinen on "Curare in Anesthesia."

The Finnish Chapter held its Annual Assembly on January 27. The following officers were elected for 1950: President, Prof. Dr. T. E. M. Kalima, Helsinki; Vice-President, Prof. Dr. Väinö Seiro, Helsinki; Secretary, Dr. Atso I. Soivio, Helsinki, and Treasurer, Prof. Dr. M. V. Vannas, Helsinki.

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of the

International College of Surgeons

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at

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New Books

The Epitome of Andreas Vesalius. Translated by L. R. Lind. New York: The Macmillan Company, 1949.

The character and personality of Vesalius rank high in interest among the great medical figures of the past. His famous *Epitome,* called by Professor Lind "a masterpiece of condensation," is here presented in admirable English, the original Latin text with its remarkably fine illustrations being appended. The late Logan Clendening, to whom the translation is dedicated, said of the *Epitome*: "Here are the very words of the master himself, freed from controversial arguments long since outmoded. Here, indeed, is the epitome of one of the greatest works on science ever to be written, one of the foundations of modern civilization."

The *Epitome* was first published in June 1543. It is a far cry from the medicine and surgery of that period to the vast and still expanding medical world of today. The pioneer work of Vesalius in anatomy, which gave impetus to the first surgery based on a comprehensive knowledge of the human body, was done under such handicaps as would have discouraged most men; misunderstanding, persecution and danger were Vesalius' daily bread. That he persisted in spite of these barriers in his path the whole world has cause to be grateful.

Something of the quality of the man, as well as his grace as a writer, may be learned from Vesalius' dedicatory letter to Prince Philip. It is, he pleads, "a situation wretched and unworthy of the greatest Emperors, Kings and Consuls that, in the pursuit of studies so varied, the harmony of the human body . . . should be constantly concealed; that man be completely unknown to himself; and that the structure of instruments so divinely created by the Great Artificer of all things should remain unexamined: since it is by the function of those instruments that those things which we look upon as most, and almost solely, important are brought to pass." Again, at the end of his foreword to the reader, Vesalius concludes with engaging hopefulness: "Farewell, and use these, my efforts, as frankly as they are offered."

That Vesalius has a strong accessory artistic talent is obvious, for the illustrations of the *Epitome* are his own work. Their quality is such as to make this book almost a collector's item. Though it will naturally find its greatest audience in the medical profession, its interest is quite as strong for anyone outside this field who cherishes any affection for the culture of the past.

Chirurgica Urgenzia. By S. Teneff. Minerva Medica, 1949. Pp. 1025; 482 illustrations.

This excellent new Italian work on surgery, which carries a foreword by Prof. A. M. Dogliotti, covers a great deal of operative territory. Urgent and emergency procedures for injuries and diseases of the various body areas are described in detail, illustrated pictorially, and arranged for ready reference. The author is doubly qualified for his task, as are so many surgeons nowadays, by a wealth of war experience in addition to his civilian practice and research.

Great emphasis is rightly laid on the importance of an accurate diagnosis and a wise choice of procedure in any emergency or critical situation, when time is of the essence if the patient is to survive. Importance is given to the efficiency of surgical instruments and devices, many of which are illustrated by photographs or diagrammatic drawings. Preoperative measures and postoperative care are outlined. The sketches of various operative technics deserve special praise.

Early Carcinoma of the Uterine Cervix. By Hansjakob Wespi. New York: Grune & Stratton, Inc., 1949. Pp. 271; 95 illustrations. With a foreword and survey by Walter Schiller.

This concise book represents a very modern and fair-minded attempt to evaluate, on the basis of actual experience and observation, the various known methods of diagnosing carcinoma of the cervix at an early stage of its growth. Dr. Schiller's extensive analysis of the problem, with full attention to the many points of controversy associated therewith, lays the groundwork well for Dr. Wespi's elucidation of his own theories, methods and experiences. The colposcopic method is particularly emphasized.

All methods outlined are correlated with a careful presentation of the pathogenesis of carcinoma and a study of the various forms of cervical epithelium as related to malignant disease. The book ends with a clear statement of the author's conclusions and a list of 235 references to other authorities. The illustrations, chiefly photomicrographs with a few charts and line drawings, are grouped at the end. The material is well and lucidly presented and, with due consideration of the fact that the ultimate problem of cancer remains so far from an adequate solution, should become a valuable contributory factor in the world-wide effort to solve it.

The Diagnosis of Pancreatic Disease. By Louis Bauman. Philadelphia: J. B. Lippincott Company, 1949. Pp. 74; 10 illustrations.

In a comprehensive study of pancreatic disease and the various diagnostic tests that have proved their validity, Dr. Bauman presents conclusions based on extensive statistical research as well as on laboratory observations at first hand. Clinical and laboratory data are abundantly available, and these have been analyzed and correlated as often as possible in tabulated form. The book contains 24 excellent tables. The illustrations are line drawings and charts.

The work of the Stockholm school in duodenal intubation is emphasized. This procedure has been found effective in determining the acinar activity of the pancreas. The importance of low blood sugar values and elevated serum amylase levels is reaffirmed. Almost every point brought forward in the test is illuminated by a detailed case report as well as by collective statistics. Particular interest attaches to the chapters "Carcinoma of the Pancreas" and "Fat Absorption Studies in Pancreatic Deficiency." This is an attractive and highly useful book for study and reference.

The Technique of Pulmonary Resection. By Richard H. Overholt and Lazaro Langer. Springfield, Illinois: Charles C. Thomas, Publisher, 1949.

It is, of course, a truism that the art and science of surgery finds one of its chief justifications, as well as many of its greatest triumphs, in the successful excision of diseased tissue from various parts of the human body. In the field of pulmonary surgery a delicate and meticulous technic is always mandatory. The authors of this new text on the subject, after a concise survey of the basic principles on which all effective surgical procedures must be grounded, proceed to an exposition of the latest methods for dealing with pathologic pulmonary conditions. The anatomic structure of the lung is considered in detail, especially with reference to dissection at the various hilar levels, and stress is laid on anatomic knowledge of the region, which is indispensable to the surgeon selecting an operative procedure for a given case.

The authors present this work as "primarily a presentation of the technic of resection" as used by themselves, describing two new devices developed in their own clinic: keeping the patient in the prone position during operative manipulation, and an atraumatic technic for dissection of the intersegmental plane, which, they say, permits removal of a segment without the use of clamps.

The volume is a small one (205 pages) but remarkably comprehensive within its stated limits. There are 122 illustrations, of which 16 are plates in full color. These, as well as the excellent line drawings and roentgenograms, furnish the reader with a graphic view of the anatomic relations, the operative field and the surgical technic employed in each instance. A full section is devoted to post-resection management, including thoracoplasty. Postoperative complications such as fistula and empyema are discussed in detail. Post-lobestomy thoracoplasty for tuberculous patients is given a separate section.

A convenient and well-organized index adds to the value of the work and facilitates speedy reference.

Care of the Surgical Patient. By Jacob Fine. Philadelphia: W. B. Saunders Company, 1949.

Emphasizing the fact that the mature surgeon considers his patient as a "whole human being" and deals with him accordingly, Dr. Fine presents a thoughtful analysis of surgical conditions, their diagnosis and treatment, and the bearing of each of them upon the total organism. Surgical technic *per se* is not discussed; in a project so broad in range this could be done only by expanding the work to several large volumes. Although the book is replete with definite surgical information, the humanistic point of view is apparent throughout.

Dr. Fine's treatise is divided into six main parts: (1) general considerations, including diagnosis, fluid and electrolyte balance, nutrition, hemorrhage, traumatic shock, and surgical infections; (2) regional and special surgery in all parts of the body, including plastic, orthopedic and pediatric procedures; (3) endocrine diseases and hormone therapy; (4) coincidental medical illnesses; (5) clinical and laboratory methods, and (6) general preoperative and postoperative care. Each of these parts is subdivided into as many minor sections as coverage demands. Illustrations and tables complement the text where they are called for, but a very large proportion of the total space (544 pages) is occupied by textual material.

Basically, Dr. Fine's purpose is not to offer another textbook on surgery but to call renewed attention to the problems of the patient who must undergo surgical treatment. In order to accomplish this effectively, he has gone over the whole field of surgical pathology and pointed out the needs and possible emergencies and complications connected with each operation, tracing them to their source and explaining what can and should be done in the way of prevention, correction and general care throughout. His book has great value for the conscientious surgeon, not only as a source of reliable reference but as a stimulus to perpetual realization of the fact that the surgeon's first duty is to con-

sider the patient and his needs. Both Dr. Fine and his patients are to be congratulated.

Chicago-Cook County Health Survey. U. S. Public Health Service. New York: Columbia University Press, 1949. Pp. 1317. 16 illustrations; 178 tables.

This massive report, the result of a comprehensive survey undertaken by the Federal Public Health Service in 1946 at the request of the mayor of Chicago and the board of commissioners of Cook County, covers all phases of public health, sanitation, hospitalization and medical care in a large metropolitan area. Water supply, milk supply, sewage and refuse disposal, housing, vermin control and communicative disease control are described. Facilities for school health, dental health, and mental hygiene are enumerated. It is hoped that the collection of so many data in one volume will not only demonstrate what has already been done in the Chicago area but indicate new and improved ways of coordinating these efforts into a strong and integrated working program.

The value of such a compendium as this is not, of course, confined to the area in which it is issued. Most of what applies to the Chicago area will apply to similar areas elsewhere.

The researcher interested in statistical data will find the book a gold mine of reference, with its nearly two hundred tabulations ranging from strictly medical to medicolegal, political, economic and industrial.

Illustrations of Surgical Treatment. By Eric L. Farquharson. Baltimore: The Williams and Wilkins Company, 1949. 3d ed. Pp. 391; 41 illustrations.

It has been aptly remarked that, so far as teaching and memory value are concerned, one picture is worth ten thousand words of text. This volume is a worthy point in evidence. Although there are only 41 plates, nearly every one of them is a multiple illustration, and all are so clear and so sagaciously chosen as to be memorable. The total impression is of a comprehensive photographic presentation of all the major problems of orthopedic surgery, supplemented by textual explanations that are remarkable for their simplicity and lucidity. As the late Sir John Fraser observed of the first edition, "Mr. Farquharson has a reputation for ingenuity, and it seems to me that this book is a confirmation of that opinion. He has produced a volume which is in some respects unique."

Mr. Farquharson's book is unusual not only for its ingenuity in presentation but for the diversity of its coverage. Although the major emphasis is on orthopedics, two sections are given over to the technics of infusion and transfusion, and there is a large appendix devoted entirely to instruments and appliances. This information will be especially useful to students in preparing for their formal examination, since the successful classroom demonstration of such devices and their management is admittedly difficult.

Handbook of Medical Management. By Milton Chatton, Sheldon Margen and Henry D. Brainerd. Palo Alto, Calif.: University Medical Publishers, 1949. Pp. 476.

This small, compact book is exactly what its title implies, a manual for quick reference. It is composed entirely of outlines, tables and synopses of symptoms and treatment. Great attention has been given to the tables of reference for physiochemical values, diets, height and weight, diagnostic tests, dosage of various drugs under different conditions, etc. The outlines cover, in the briefest possible form, all pathologic conditions and emergencies encountered in ordinary practice; each presents the symptoms, course, and recommended treatment. Such widely used procedures as blood transfusion and gastric suction are explained. There is a comprehensive section on poisons, their action and their antidotes.

According to the authors' preface, the Handbook will be revised each year, in order that no new technic or discovery of demonstrable importance may be omitted.

A Practice of Orthopedic Surgery. By T. P. McMurray. Baltimore: The Williams and Wilkins Company, 1949. 3d ed. Pp. 444; 191 illustrations.

Here is a concentrated treatment of orthopedic surgery as applied to pathologic conditions and injuries other than fracture. Fractures are not discussed because, says the author, "this subject is such a large and important branch of surgery that it deserves consideration in a separate volume." In this volume, therefore, he confines himself to other aspects of his general theme, defining orthopedic surgery as "the surgery of the locomotor system embracing the treatment of injury, disease or deformity of the limbs, joint and spinal column." Emphasis is placed, in the introductory chapter, on the importance of taking into account not only the immediate correction but the possibility of later alterations due to growth or other factors.

Tubercular, arthritic and neoplastic diseases of the bones and joints are discussed and illustrated in detail. Peripheral nerve injuries, diseases of muscle and tendon, and congenital deformities and dislocations are approached in the light of the most recent surgical knowledge. The author is meticulous in his description of available corrective

apparatus and of the criteria by which the orthopedist may evaluate the results obtained. The sections on spastic paralysis and osteitis deformans have special interest.

Mobilization of the Human Body. By Harvey E. Billig, Jr., and Evelyn Loewendahl. Stanford, California: Stanford University Press, 1949. Pp. 62; 25 illustrations.

The effectiveness of well-planned exercises in improving physical health and assisting convalescence has been made the basis of a short but pertinent work written in a simple, readable style and clearly illustrated with good photographs and line drawings. Dr. Billig recommends "progressive stretching" as a means of loosening contracted fibrous tissue and thereby relieving pain and various other discomforts. All of the exercises included have been tested and proved helpful. Problems of posture as well as various pathologic conditions have responded well to their use. The book will be welcomed by physicians, physical therapists, physical education teachers and all others concerned with prophylaxis and rehabilitation in this area.

A Textbook of Surgery. Edited by F. Christopher. Philadelphia: W. B. Saunders Company, 1949. 5th ed. Pp. 1550; 742 illustrations.

Ninety-eight distinguished surgeons contribute to this new edition of Dr. Christopher's well-known and widely used textbook on general surgery. With such a roster of recognized authorities brought together in one volume, the resulting work can hardly fail of distinction.

An important feature is the emphasis laid on etiology, pathology and diagnosis, which are discussed quite as thoroughly and meticulously as is surgical technic. The entire work is based on modern methods that have been tested and proved; debatable technics and those which have not been adequately evaluated as yet are omitted. Some thirty new sections have been added, each by a prominent specialist in the field. The book is well organized and illustrated and appears in a format whose excellence is commensurate with the work.

Autobiography of Dr. Robert Meyer. By Robert Meyer, with a memoir of Dr. Meyer by Emil Novak, New York: Henry Schuman, Inc., 1949. Pp. 126.

For a man whose name and achievements are known throughout the medical world, Dr. Meyer's autobiography is an extremely modest one. He calls it "a short abstract of a long life," and the book itself as nearly as terse as this subtitle. Its brevity and compactness, however, are so strongly in character with the man revealed in its pages that nothing of value is lost through this condensation.

Dr. Meyer was born in Germany in 1864 and died in the United States, of which he had become a citizen, in 1947. "I have had an exceedingly beautiful life," he says, "which would be worth living once more." Not many elderly men can say as much, even though their lives have been lived in comparative comfort and ease. That Dr. Meyer could say in spite of the fact that his later years were ravaged by Nazi persecution is evidence enough of his personal quality.

Robert Meyer's achievements in gynecological pathology, which included triumphs in writing, teaching and research as well as in therapy, are too well known to require enumeration here. His talents as a writer were obviously beyond the usual, and in his autobiography he reveals from time to time a dry, sometimes rather caustic humor that makes his life story as fascinating to the lay reader as to the physician. Dr. Emil Novak, who wrote the foreword and assisted in the preparation of the manuscript, quotes his whimsicalities repeatedly and with delight. In describing two pharmacists of the town in which he first practiced, Dr. Meyer observed, "One of them played the flute, and the other was also a little silly."

It would be cheating the reader to include more of these refreshing comments. Those who find pleasure in the contemplation of a fellow human being who was also a great doctor, but never lost the common touch; who suffered hardship and persecution, but was never embittered; who succeeded greatly but made little of his success and much of the joy of the struggle, will read Dr. Meyer's story with great satisfaction.

Abstracts from Current Literature

Ten Years' Progress in Ophthalmology. Stuard, C. G., *J. Oklahoma State Med. Assoc.* **42**:90, 1949.

Ophthalmology has kept astride with new and improved methods to preserve man's most precious possession—good vision. Trachoma, particularly in its devastating stages, is now much reduced in incidence and morbidity because of the sulfonamides. The intracapsular technic of cataract extraction has reduced the waiting period with poor vision until the cataract became mature, necessary during the decades when the extracapsular technic was in vogue. Many children with strabismus have their eyes straightened by operative and nonoperative means before they reach school age instead of waiting for a spontaneous cure. Retinal detachment previously considered a hopeless catastrophe resulting in blindness is now successfully treated by diathermic multiple puncture. The sulfonamides and antibiotics have revolutionized the treatment of many pathologic conditions. Among these may be mentioned gonorrheal ophthalmia and interstitial keratitis. Serpiginous ulcer due to the pneumococcus is now successfully prevented by more intelligent treatment of corneal foreign bodies and abrasions. Perforation of the ulcer with resulting loss of the eye is now prevented by the use of sulfonamides and antibiotics. External infections of the eye, such as orbital cellulitis, retrobulbar abscess and infection of the tear sac, have had their severity modified. The anticoagulants have been life-saving drugs in the treatment of cavernous sinus thrombosis. Roentgen rays and radium have been utilized in the treatment of certain eye conditions that were previously not responsive to known methods. The beta rays of radium emanation are now used in vernal conjunctivitis, pterygium and sclerosing conjunctivitis. Roentgen treatment has proved efficacious for angiomatosis retinae, retinitis proliferans, malignant disease and certain sulfonamide- and penicillin-resistant ulcers, such as those caused by Bacillus pyocyaneous. A better understanding of the fundamentals of good results following corneal transplantation has been established. A reasonably healthy corneoscleral circulation is a primary requisite for operation. Contact lenses are now accurately fitted by means of molds taken of the patient's eyes and are usually made of plastic material. The solutions used in the wearing of contact lenses are less irritating and more optically inactive. Glaucoma remains the outstanding cause of blindness, and the best advice the physician can give the patient complaining of visual difficulty is to see the ophthalmologist. Preschool visual examination and an estimate of vision and ocular conditions in general physical examination prove revealing in a great percentage of cases. As we strive to help man live longer, we should strive to help him see.

ROLAND I. PRITIKIN

Vaginal and Ovarian Metastases from Hypernephroma. Martzloff, K. H., and Manlove, C. H., *Surg., Gynec. & Obst.* **88**:145, 1949.

A case is described in which a recurring tumor of the vagina was observed over a period of two years. The vaginal metastases were the first evidences of an unsuspected left renal hypernephroma. This case represents the twenty-third instance of such a complication of hypernephroma. Usually the original site of the hypernephroma is in the left kidney.

M. T. FRIEDELL

Cystic Tumor of the Mesentery Simulating a Cyst of the Ovary. dos Santos, F., *Ginecologia* **4**:139, 1949.

Errors of diagnosis are frequently made concerning neoplasms that are considered to be attached to the ovary but on opening the abdominal cavity prove to be completely independent of the genitals. A case of cystic tumor of the mesentery simulating a cyst of the ovary is described. Laparotomy was performed and the tumor easily extirpated. When its capsule was opened, a dense and cystic liquid was found and microscopically examined. The examination showed its parasitical origin (Bancrofti parasite), and this was confirmed by examination of the blood.

CARVALHO PINTO

Necrotic Jejunitis. Fick, K. A., and Wolken, A. P., *Lancet* **1**:519, 1949.

An endemic, severe and often fatal disease of the jejunum has been observed in northern Germany during the past few years. This disease is characterized by a sudden onset with severe pain in the upper part of the abdomen, nausea and vomiting. The pain is a little to the left side, and there are hyperesthesia and rigidity in the left upper quadrant. Circulatory collapse is marked. This comes on at an early stage, and the patient may die within twenty-four hours. Those surviving this stage show a bloody diarrhea or evidence of paralytic ileus. The sedimentation rate is high and the leukocyte count is increased. The disease must

be differentiated from perforated ulcer, acute obstruction of the small intestine and acute pancreatitis.

In severe cases resection, exteriorization and the establishment of a fistula in the small intestine are recommended. Patients less severely affected may survive with conservative treatment.

The pathologic condition may be confined to one or more parts of the jejunum or may affect the whole of it. There are definite lines of demarcation between the normal and the diseased portions of the bowel. The affected area is sausage-like in appearance; it is rigid and has a bright red serosa bearing vertical striations.

Edema may be so marked as almost to occlude the lumen. Late in the disease there is definite necrosis, involving the mucosa and at times also the submucosa. Sloughing results in extensive ulceration. Perforation, peritonitis and hemorrhage often occur. If the patient survives the necrosis scar stenosis or peritoneal adhesions may lead to mechanical obstruction.

The cause of this disease has not been established. Many suggestions have been made but none proved. The most commonly accepted theory is that there is an invasion of the intestinal wall by normally nonpathogenic bacteria when resistance is lowered by a general change and restriction of diet.

J. O. MORGAN

Clinical Experiences with Chlorophyll Preparations. Carpenter, E. B., *Am. J. Surg.* **77**:167, 1949.

By stimulating tissue cells, chlorophyll exercises an indirect antibacterial activity against anaerobic infections.

In a period of nine months 127 patients were treated by chlorophyll preparations. Of the 74 with chronic osteomyelitis, many had already been submitted to operation and had received penicillin locally and parenterally. In 59 cases a thorough sequestrectomy was done, followed by instillation three times a day of 10 cc. of chlorophyll-penicillin solution through an indwelling catheter placed in the medullary cavity. The wound was packed loosely with fine mesh gauze. Delayed primary suture of the wound was done in five to eight days after removal of the catheters. Of the 59 patients so treated, 56 healed per primum. The 3 failures showed that the infecting organism was Pseudomonas aerogenes.

Twenty-five patients with chronic osteomyelitis secondary to compound fracture were treated first with plain solution of chlorophyll applied directly to the wound. As gross infection diminished, sequestrectomy was done, with instillation of chlorophyll-penicillin solution. Rapid disappearance of four odor from the wound was a noticeable feature. Twenty-three patients showed prompt healing. Additional surgical treatment was necessary for 6.

Nine decubitus ulcers in paraplegic patients were treated with plain chlorophyll solution applied as a wet dressing. As soon as the gross infection subsided, a thick layer of chlorophyll ointment approximately ¼ inch thick was applied. The results were most satisfactory.

Six patients with varicose ulcers who had failed to respond to the usual treatment were selected. In each, a thick coating of chlorophyll ointment was applied to the ulcer and gauze sponges were applied over it and secured in position by a pressure bandage. Healing was noticeably rapid.

R. N. COOPER

Encephalic Tumoral Metastasis and Tumors of the Nervous System as a Cause of Metastasis. Gama, C.: *Neurobiologia* **12**:1-34, 1949.

The concept of metastasis is here broadened to include cases in which tumors in the vicinity extend to the nervous tissue through lymphatic or other channels, as well as by metastasis to the meninges. Furthermore, there were included also 4 cases of primitive brain tumors with metastasis to the spinal cord, as they presented all the characteristics of the tumors under discussion. In this broad sense there are 18 cases of metastatic tumor of the nervous system treated by the author. Taking as reference the probable route of invasion of the neural axis, the metastatic tumors were distributed in three groups: (1) cerebral metastasis (11 cases), by way of the blood stream; (2) invasive tumors of the brain (3 cases), through lymphatic channels, and (3) spinal cord metastasis (4 cases, by the arachnoid route). With reference to the total sum (733) of brain tumors (692) and spinal tumors (41) treated by the author, the metastatic growths in the nervous system represent 2.6 per cent of the brain tumors and 2.45 per cent of the central nervous system tumors. Distributed according to their histologic nature, these were: carcinomas, 67 per cent; hamangioglastomas, 16.5 per cent; medulloblastomas, 5.5 per cent; hypernephromas, 5.5 per cent; and sarcomas, 5.5 per cent. Classified by point of origin, they were: mammary glands, 28 per cent; lungs, 17 per cent; base of skull, 11 per cent; cerebellum, 11 per cent; cerebrum, 5.5 per cent; scalp, 5.5 per cent; liver, 5.5 per cent; uterus, 5.5 per cent; and adrenals, 5.5 per cent. The postoperative duration of life varied between six month and four and one-half years in the 8 patients who could be followed.

CARVALHO PINTO

Cancer in the Lactating Breast. McLellan, P. G., *Connecticut S. M. J.* **13**:47, 1949.

Carcinoma of the lactating breast, though found to have an incidence of 2 per cent in previous large series, was found by the author to have an incidence of 0.9 per cent from records of 1,359 cases of breast carcinoma at the Hartford Hospital, and an incidence of 0.8 per cent as reported by the Connecticut State Department of Health in an analysis of 5,213 cases of breast cancer.

Eleven of the 14 cases reported by the author had unfavorable outcomes. Two patients were still living after eight and sixteen years respectively, and 1 died fourteen years after her original mastectomy, of brain metastases. These latter 3 were given many years of life through early and adequate radical mastectomy, proving to the authors that such intervention is indicated when no obvious contraindication exists.

The author then postulates that the prognosis of carcinoma of the lactating breast is definitely poorer than that of other breast cancers, because of (1) increased vascularity and (2) increased estrogenic stimulation in the pregnant patient. He then suggests that if the patient seems operable, and after radical mastectomy and pathologic study would appear to have a favorable prognosis, no further treatment may be necessary.

Subseqeunt pregnancies are not deemed a serious threat to the other breast, and termination of pregnancy is not considered an essential part of routine treatment. Preoperative irradiation is frowned upon in these cases.

J. W. BRADY

Ligation of the Common Carotid Artery. Rogers, L., *Lancet* **1**:949, 1949.

Ligation of the common carotid artery may produce complications either because of immediate cerebral ischemia or because of delayed thrombosis or embolism from the site of the ligature. The author reports a series of 19 cases in which he has ligated the common artery without mishap, combined with a review of recently published cases. He states without hesitation that in a reasonably fit person, provided the tolerance test is satisfactory, it is safe to divide the common carotid artery.

Division of the artery not only severs the sympathetic fibers, abolishes spasm and prevents recanalization but reduces the liability to delayed embolism, since there is no pulsation in the distal part of the severed artery.

The accompanying vein is not ligated or severed since electro-encephalography at the time of occlusion. Rogers shows that cerebral anoxia is increased if the vein is ligated at the same time as the artery.

The tolerance test is done to ascertain the competence of the circle of Willis and to give rise to a collateral blood supply. Every ligation of a carotid artery, consequently, must depend primarily on the absence of disturbance of cerebral circulation and on the presence and patency of this anastomotic circle.

It is safer to ligate the common rather than the internal carotid artery, because the blood flow is thereby materially reduced but not completely abolished. There is a free anastomosis across the midline of the neck between the two external carotid arteries. The blood flow is therefore reduced about half but not abolished.

CHARLES C. ABBOTT

Liver Function. Rossiter, R. J., *Univ. Western Ontario M. J.* **19**:1, 1949.

The author presents a complete study of liver function and describes in detail the various tests and their interpretations. The paper is especially valuable in the differentiation of damage to liver parenchyma and the differentiation from biliary obstruction. He also includes tests to be employed in patients with both conditions. The paper is to be recommended as one of the most complete that has been published in recent years on liver function and biliary obstruction.

LEIGH F. WATSON

The Effect of Tetraethylammonium Chloride on Peripheral Blood Flow. Veal, J. R.; Shadid, J. N., and Jamison, W. L., *M. Ann. District of Columbia* **28**:113, 1949.

Veal and his associates describe changes in venous pressure in the extremities. Their experience with tetraethylammonium chloride has fallen short of expectations when compared with the after effects of a novocaine block of the sympathetic ganglions.

Changes in the venous pressure were used to measure the efficacy of tetraethylammonium chloride as compared with lumbar sympathectomy. By this means the authors were able to show that small doses of tetraethylammonium chloride, 7 mg. per kilogram of body weight, may temporarily increase the peripheral blood volume. The increase is seldom maintained more than twenty minutes. However, associated with reduced arterial pressure there is a decrease in the peripheral blood flow. Elevation of the blood pressure by epinephrine will increase the blood flow. In sympathectomized extremities tetraethylammonium chloride will reduce the peripheral blood flow, apparently because of a fall in blood pressure.

M. T. FRIEDELL

Palliative Operations for Carcinoma of the Pancreas. Sanders, R. L., and Porter, C. H., *South. Surg.* **15**:383, 1949.

The desirability of radical operation for carcinoma of the pancreas is not questioned, but the results are so frequently disappointing that this method of treatment should be reserved for the most favorable cases. Several points are made to substantiate this opinion: 1. A positive diagnosis is difficult even at operation, and the risk of reseeting a benign lesion is not to be ignored. 2. A large percentage of the patients are in the older age groups and are frequently debilitated; therefore they tolerate such a formidable operation poorly. 3. Technical difficulties are great, and postoperative complications are numerous. 4. Physiologic conditions are greatly altered by pancreatic resection and can be only partially corrected by drugs and other measures. 5. The operation carries a mortality rate of from 20 to 50 per cent. 6. The length of the survival period following radical resection does not differ materially from that following a palliative procedure. 7. Only a small number of three-year to five-year cures have thus far been reported. For these reasons it is felt that side-tracking operations are still the best recourse in the majority of cases of malignant pancreatic disease.

The diagnosis of carcinoma of the pancreas is difficult and often impossible without biopsy. Painless jaundice is by no means characteristic of all cases of this disease. In many instances the condition is neither painless nor manifested by jaundice. Vague epigastric fullness and distress, nausea, vomiting, loss of appetite, weight and strength are frequently the early symptoms. These symptoms should prompt the physician to make an exhaustive survey of the case. The jaundice resulting from these lesions usually develops rapidly; it is associated with pruritis, a high icteric index, an enlarged liver and a distended gallbladder. The jaundice is constant, and chills and fever are conspicuously lacking. Pain is quite variable. It may be described by the patient as a dull ache in the epigastrium or pain of a deep and boring quality, extending through to the back. Others have cramping and colicky pains. In most cases the pain, like jaundice, is constant. Laboratory studies are, on the whole, of little value. Roentgenologic examination may reveal displacement of the stomach or deformity of the duodenum.

A study of 81 cases of carcinoma of the pancreas is reported. The outstanding symptom in 63 patients was jaundice; pain was the chief complaint of 43, and a palpable abdominal mass was present in 42 cases. In 14 patients of this group the disease was believed to be too far advanced for exploration; 17 underwent explorations only, and 50 underwent some type of palliative operation. Of the 67 operated upon, 48 had carcinoma of the head of the pancreas, 9 had lesions of the pancreatic body or tail or both, and in 10 the growth was diffuse. The procedures carried out were cholecystojejunostomy, cholecystogastrostomy and choledochoduodenostomy. Since 1937 cholecystojejunostomy has been done almost exclusively in these cases. The technic of this operation is least difficult, and complications are infrequent. The total operative mortality rate was 8 per cent. The duration of life after operation was twenty-five days to two and one-half years. The average length of life was seven months.

Symptomatic relief following side-tracking operations is often excellent. The jaundice clears, itching subsides and minimal digestive disturbances are experienced.

J. O. MORGAN

Spontaneous Perforation of the Oesophagus. Scholefield, J., *Brit. Med. J.* **1**:348, 1949.

Two cases are presented of rupture of the undiseased esophagus, seen at the West Middlesex Hospital in Isleworth, England. In the second case the patient was restored to health by prompt surgical intervention. A plea is made for early diagnosis, since the majority die in forty-eight hours if untreated. Of some 60 patients whose cases are reported in the literature, at least 3 have survived without operation, and there have been cases reported of late drainage followed by cure in patients who have localized the spreading infection.

Vomiting is the presenting feature in almost all reported cases. Apparently the sphincter at the cricoid level fails to relax, and the esophagus tears at the lower end. Tears may also follow crushing injuries to the abdomen or occur during convulsions or after defecation. Autopsy uniformly fails to reveal any local disease of the esophageal wall to explain the rupture.

A longitudinal tear 1-8 cm. in length is found, usually in the left posterior wall. This is followed by agonizing pain and shock, with dyspnea and cyanosis commonly developing. Some relief may be obtained by sitting in bed. There may be boardlike epigastric rigidity. Two phenomena give the surest clues to the diagnosis—pleural effusion and (in many cases) surgical emphysema beginning at the upper level of the sternum.

Transpleural approach with primary repair of the tear and intensive use of antibiotics is recommended. Feeding is best handled by a nasal indwelling tube. The position of the tube should be checked, as it has been known to pass through the rent into the mediastinum.

W. R. LOVELACE

Armamentarium

Blood Group Specific Substances: The "conditioning" of Group O blood by the addition of Blood Group Specific Substances A and B, produced by Sharp & Dohme of Philadelphia after their initial development by Dr. Neils C. Klendshoj and Dr. Ernest Witebsky of the University of Buffalo Medical School, makes blood of this group universally suitable for transfusion, it is claimed. Specific Substances A and B reduce the concentration of anti-A and anti-B agglutinins in Group O blood to a safe level, so that the danger of untoward reactions is negligible. In a study of the results of this type of transfusion in 1,045 routine cases during a period of five years, it was found that the total reaction rate, including pyrogenic, hemolytic, allergic and circulatory reactions, was even less than when homologous blood was used.

Radiation Counter: An instrument known officially as the Five-Fold Beta Gamma Hand and Foot Counter, has been developed by RCA Victor, a division of the Radio Corporation of America, under the Atomic Energy Commission's program to safeguard those engaged in handling fissionable material. The instrument is said to measure radiations emanating from the hands and feet of persons working with radioactive substances, as well as any background radiation that exists. Automatically subtracting the background count, it determines whether the worker can safely leave the radioactive premises or must undergo further decontamination "baths."

Diodrast for Children: A new 20 cc. ampule of the radiopaque substance diodrast, in 70 per cent solution, is offered by Winthrop-Stearns, Inc., of New York, as a special children's dose for use in roentgen visualization of the heart and great blood vessels. It is indicated particularly as an aid to the diagnosis of congenital cardiac disease.

The same distributors also offer a 50 cc. ampule of diodrast 70 per cent, which is extensively used for angiocardiographic study. The 35 per cent solution, especially valuable in urography (excretion tests) comes in ampules of 10, 20 and 30 cc. It is especially adapted to the differential diagnosis of renal malignant tumor, tuberculosis, calculi, hydornephrosis, nephrotosis, changes due to pregnancy and anatomic anomalies. Arteriographic, venographic and cholecystographic procedures also indicate the use of diodrast. For direct (cholecystographic) visualization of the gallbladder and bile ducts during operation, either the 35 per cent or the 70 per cent solution should be used.

Bactericidal Agent: The new compound Sulfamylon- Streptomycin (Winthrop-Stearns, Inc., New York) is said to exert a stronger effect on Bacillus pyocyaneus than does any other similar preparation. It destroys all strains of bacteria commonly found in wounds, becoming effective after a short period of contact. The preparation was tested by Dr. W. R. Whitehouse, Dr. R. W. Kimbro and Dr. G. R. Wright of the Kimbro Clinic, Cleburne, Texas, in the following types of wounds, some of which were infected or heavily contaminated: perineal wounds (330 cases); ruptured appendix (4 cases); abdominal wounds (525 cases), and minor wounds of other areas (756 cases). Primary healing occurred in the perineal (episiotomy) wounds. In both infected and contaminated abdominal wounds only 2 showed evidence of slight serous drainage, and none showed gross infection. There was no evidence of local or systemic toxic reaction, and healing occurred with minimal debridement.

Chloresium Inhalant: Chloresium Aerosol Solution, produced and distributed by the Rystan Company, Inc., Mount Vernon, N.Y., is said to fill a dual role in the inhalation treatment of infections of the respiratory tract. Used alone, it exerts the same bland, nontoxic, healing and deodorizing action in the respiratory tract that is associated with the topical application of Chloresium Ointment and Solution (Plain) to wounds, burns and dermatoses, additionally providing decongestion without rebound phenomena; and when used as a vehicle for penicillin it is said to enhance the effectiveness of the antibiotic by producing higher blood levels and maintaining them over an extended period, at the same time exerting its own therapeutic effect.

Mouse and Rat Cages: To provide greater durability under repeated handling and to prevent damage from gnawing by rodents as well as rusting, the National Institute of Health of the United States Public Health Service, Bethesda, Maryland, and numerous other Government research departments, have installed cages made of acrylic plastic (Plexiglas). Large numbers of laboratories in hospitals, universities and clinics throughout the country have also adopted these cages, which were developed by the Keystone Plastics Company of Swarthmore, Pa. The solid plastic walls protect the animals against drafts and sudden temperature changes. They are also designed to permit rapid, accurate research work. Each cage has an ample frosted area on one end for recording of data.

In Memoriam

JOSEPH ANTHONY COSCARELLO

M.D., A.I.C.S.

Dr. Joseph Anthony Coscarello, of Philadelphia, passed away Oct. 15, 1949. A 1924 graduate of Hahnemann Medical College, Dr. Coscarello specialized in obstetrics and gynecology. His graduate work was done at the Women's Homeopathic Hospital and the Broad Street Hospital, both in Philadelphia. He was a member of the American Medical Association, of Pennsylvania State and County Medical Societies and of the Homeopathic Medical Society of Philadelphia.

ONEY PERCY SMITH

M.D., A.I.C.S.

Commander Oney Percy Smith, Medical Corps, U.S.N.R., formerly of Troy, New York, passed away early in the new year. Commander Smith was a graduate of the College of Medicine of the University of Vermont. For seventeen years he held increasingly responsible posts on the surgical staffs of Samaritan Hospital and Troy Hospital. At the time of his death he was Senior Medical Officer at the Naval Training School at Richmond, Virginia. He was a member of the American Medical Association, the New York State and Rensslaer County Medical Societies and the Association of Military Surgeons of the U.S.A. He was also an Associate Member of the International College of Surgeons.

JOSEPH M. MORSE

M.D., F.I.C.S.

Dr. Joseph M. Morse of Brooklyn, New York, succumbed to cardiac failure on December 28, 1949. A graduate of New York University and Bellevue Hospital Medical College and a former Associate Surgeon at Beth Moses Hospital, Dr. Morse served also as Instructor in Anatomy, Experimental Surgery and Cadaver Operative Surgery at Bellevue. He was a member of the Kings County Medical Society and of its cultural division and also of the Brooklyn Thoracic Society.

SAMUEL DINWIDDIE WEAVER

M.D., F.A.C.S., F.I.C.S.

Dr. Samuel Dinwiddie Weaver of Dallas, Texas, died on January 20, 1950, after a distinguished career in general surgery. Dr. Weaver was a medical graduate of Tulane University and a former Fellow in Surgery at the Mayo Foundation. He also served on the surgical staff of the Mayo Base Hospital, A.E.F., in World War I. He was Chief Surgeon at the Baylor Hospital and later at the Woodlawn Hospital, and also a member of the Visiting Surgical Staff of the Parkland Hospital. He was Professor of Clinical Surgery at Southwestern Medical School and was well known as a contributor to surgical publications.

Dr. Weaver was a member of the American Medical Association, the American College of Surgeons, the International College of Surgeons, the Texas State and Dallas County Medical Societies, the Texas Surgical Society (of which he was a Past President), the National Gastroenterological Society and the Dallas Society of General Surgeons.

ARTHUR JOSEPH NEUMANN

M.D., A.I.C.S.

February 1, 1950, marked the passing of Dr. Arthur Joseph Neumann of Detroit, Michigan. Dr. Neumann attended the Detroit College of Medicine and Surgery and Loyola University, taking his medical degree from the latter. His postgraduate studies were conducted in Vienna, Edinburgh and Glasgow. He was chief of the surgical staff at Grosse Pointe Hospital from 1925 to 1940, and from 1945 to the time of his death held a similar position at Jefferson General Hospital, as well as that of visiting surgeon at Holy Cross, Mount Carmel and St. Mary's Hospitals. Dr. Neumann's practice was entirely surgical and devoted especially to abdominal surgery and gynecology. He was a member of the American Medical Association, the Michigan State and Wayne County Medical Associations, the East Side Physicians' Association, the American Association of Military Surgeons and the Association of Abdominal Surgeons and Gynecologists.